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ABSTRACT

This document combines all 1983 issues of a newsletter that focuses on issues of giftedness and talent. Among the major articles are discussions of the talent search conducted at five universities across the country; personal counseling approaches; the transition from high school to college; comparisons among Japanese, Soviet, and U.S. schools; advanced placement program credits; counseling needs of gifted females; study suggestions; challenges of serving mathematically able girls; computer contributions to gifted education; gifted preschoolers; the international baccalaureate program; science and the young gifted child; advantages of acceleration; a college for high school age students; use of standardized tests in identifying gifted children; and suggestions for artistically precocious students. Brief biographical sketches of Robert Heinlein, Jon von Neumann, Flannery O'Connor, Thomas Paine, and Marie Curie are included. (CL)

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CHRONICLE
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TALENT SEARCHES: A NATIONAL AND INTERNATIONAL EFFORT

Sanford J. Cohn, Ph.D.[1]

The name "Talent Search" defines the process whereby able junior-high-school-age youths are invited to take The College Board's Scholastic Aptitude Test (SAT) to get an accurate appraisal of their mathematical and verbal reasoning abilities and developed skill in the use of standard written English. The Talent Search originated as a solution to the mental measurement problem of assessing extremely able youngsters developed by Professor Julian C. Stanley at The Johns Hopkins University in 1969. Having applied the use of advanced-level instruments to young students in an out-of-level testing format to a few individual cases that came to his attention, Stanley quickly realized the value of amplifying the process to a far grander scale. As a result the Study of Mathematically Precocious Youth (SMPY) was born in 1971, and in 1972 an active search for junior-high-school-age youths who reason extremely well was begun. Six Talent Searches were conducted by SMPY through 1979, involving more than 10,000 youngsters. With the creation of the Office of Talent Identification and Development

cont'd. on p. 2

TALENT SEARCH REGIONS

LEGEND:
Project for the Study of Academic Precocity (PSAP), Arizona State University
Rocky Mountain Talent Search (RMTS), University of Denver
Midwest Talent Search Project (MTS), Northwestern University
Talent Identification Program (TIP), Duke University
Center for the Advancement of Academically Talented Youth (CTY), The Johns Hopkins University

1982-83 TALENT SEARCHES

REFLECTIONS ON UNIVERSITY-BASED TALENT SEARCH PROGRAMS

William G. Durden, Ph.D.[1]

Time is perhaps put to no better use for educators than to gather with colleagues and reflect upon origins, experiences, and shared aspirations. If one is fortunate, it may occur that for a brief moment the complexities of daily effort crystallize into clarity and future resolve.

Over the last few years I have been privilege to the thoughts of the four other Directors of university-based Talent Searches in the United States - Dr. Sanford J. Cohn [Director of the Project for the Study of Academic Precocity (PSAP) at Arizona State University], Dr. Kenneth Seeley [Director of Rocky Mountain Talent Search (RMTS) at the University of Denver], Dr. Robert Sawyer [Director of the Talent Identification Project (TIP) at Duke University], and Dr. Joyce Van Tassel-Baska [Director of the Midwest Talent Search (MTS) at Northwestern University][2] - about our responsibilities and objectives. A recent chance meeting in Arizona with two of the Directors, Dr. Sanford Cohn and Dr. Joyce VanTassel-Baska, has prompted me to share with you my gathered reflections about university-based Talent Searches, programs that have already affected the design of academic curriculum for thousands of intellectually talented youths.

While the implementation of the Talent Search may be adapted to the particular strengths of each participating university, we should never deviate from the original rationale that caused Dr. Julian C. Stanley and his early associates involved with the Study of Mathematically Precocious Youth (SMPY) at The Johns Hopkins University to initiate the entire undertaking some eleven years ago:

1. That gifted and talented youths have an opportunity to advance educationally according to their own individual rate of learning and level of performance;
2. That gifted and talented youths have an opportunity to use to the fullest extent their various cognitive abilities;
3. That gifted and talented youths have an opportunity to fulfill their intellectual aspirations regardless of the age at which their abilities first appear; and,
4. That gifted and talented youths have an opportunity to appropriate academic curricula, which have been organized according to both scope and sequence.

Our efforts should reflect a clearly articulated philosophy and a deliberate teleology (i.e., we need to know where we are going!). Disparate lessons, isolated courses, selected competitions, unable to answer collectively the question, "Where is all this leading?", do not represent a comprehensive, integrated, and fundamental education. It is the responsibility of the university-based Talent Search group to strive for an educational philosophy that combines the actions of gifted students, their instructors, parents, and school administrators into the context of a valid and clearly defined course of action. The outlines of this comprehensive philosophy are beginning to emerge.

1. Exceptional mathematical and/or verbal reasoning abilities among young students can be identified by a systematic and valid means, the Talent Search. The Talent Search is itself a strategy to compensate for the fallibilities of mental measurement applied to the highly able and consists of the use of age-appropriate measures to establish eligibility followed by out-of-level measures

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Reflections, from p. 1

to allow for accurate appraisal of a youth's actual degree of developed capacity. The single instrument that has provided the most effective tool for use in this out-of-level measurement phase within the context of the Talent Search (i.e., for seventh and eighth grade age students) has been The College Board's Scholastic Aptitude Test (SAT). Many reasons support the use of this measure: it assesses mathematical and verbal reasoning abilities rather than passage through specific courses of study; outstanding performance on it is recognized almost universally by colleges and other institutions of higher learning as an important factor in the admissions process; it is administered under standard conditions by trained personnel frequently in hundreds of towns and cities throughout the country; and it is secure.

2. The university-based Talent Search model is self-consciously limited in audience: only those youths with outstanding mathematical and/or verbal reasoning abilities. This decision is taken with the resolution that quite often those programs which suppose to do all for all people result in doing little for anyone. A sense of institutional focus is the watchword.
3. As a result of the Talent Search, identified students should be provided with opportunities for appropriately demanding course work that matches their intellectual abilities and rate of learning. The prototype for such course work is found in the university-sponsored academic commuter and residential programs. It is this prototype that with deliberation and proper guidelines can be implemented *at little net cost* in the local school setting.
4. Appropriate course work for these students should be:
   -traditional, as defined by the liberal arts curriculum [(e.g., each university-based program should have at its core a fast-paced precalculus mathematics sequence employing (often with the use of mentors) the diagnostic testing followed by prescriptive instruction format, an *expository* writing sequence, and a classical language component, such as Latin or Latin and Greek in current use]
   - continuous progress, in the sense that once a particular subject or sequence of courses is begun, strategies should be devised to insure that a student can advance without interruption to the next level of course complexity
   - certified by resulting credit either at the high-school or college level (preferably by means of regionally or nationally accepted standardized achievement tests or The College Board's Advanced Placement Program or the International Baccalaureate Program)
   - flexible, in the sense that a child's mental abilities should guide subject-matter placement rather than chronological age.
5. Programs associated with the university-based Talent Searches do not attempt to teach "creativity" *per se*. Our task is to give form to the creative impulse. Here we are acting in an historical context. Much creativity has been unduly spent in the absence of a form with which to represent it, for example, expository writing techniques, literary genres, symphonic modes, or mathematical formulations. For us, creativity naturally emerges for intellectually talented youths when the circumstances include highly motivated students, teachers who are both expert in their subject and passionate about its instruction, and substantive material for study.
6. Excellence and challenge should be sought at every point in a student's education. Discipline and hard work, as well as humor, belong to intellectual pursuit. Such commitment should not exclude obtaining a rich background in the historical tradition and culture. As T.S. Eliot said, "Tradition is a matter of much wider significance. It cannot be inherited, and if you want it you must obtain it by great labour. It involves, in the first place, the historical sense, which we may call nearly indispensable to anyone who would continue to be a poet beyond his twenty-fifth year."[3]
7. The distinguishing feature of a university-based Talent Search program rests in the support of its rationale and procedures by a rigorous and systematic evaluation process, which includes both year-to-year assessment to determine short-term effectiveness (i.e., truth in advertising) and longitudinal study to insure the long-range value of our methods over a person's lifetime. The results of such studies should be shared through publication and discussion in a variety of public forums.

We believe the university-based Talent Search model to rest upon sound educational tradition and practice. It is this foundation and our responsibility to acknowledge it that propel us into the future.

FOOTNOTES

[1]Dr. Durden is Director of the Center for the Advancement of Academically Talented Youth (CTY), known formerly as the Office of Talent Identification and Development (OTID), at The Johns Hopkins University, where he also serves as Assistant Professor of German.

[2]It should be noted that each of the five university-based Talent Search sites is individually administered and stands in no official relationship with the others.

[3]This quotation was taken from T.S. Eliot's "Tradition and the Individual Talent." It was written with regard to the poet, but it could be easily applied to a young student.

Talent Search Effort, from p. 1

(OTID) at Johns Hopkins [now called the Center for the Advancement of Academically Talented Youths (CTY)], the Talent Search function was transferred from SMPY to this new office and a search for verbally talented youths was begun as well. Since that time several other universities throughout the country have begun replications of the Talent Search effort. SMPY still conducts a search, however, on a national basis for youngsters who score 700 or better on the Mathematics Section of the Scholastic Aptitude Test (SAT) prior to age 13; CTY also conducts a search on a national basis for youths who score 630 or better on the Verbal Section of the SAT prior to age 13.

The start of the 1982-83 academic year marks the first time that all 50 states in the U.S.A. and five Canadian Provinces (plus Hamburg, West Germany, and other Americans Abroad) comprise the search region for the Talent Search efforts of five universities: Arizona State University, Duke University, Johns Hopkins University, Northwestern University, and University of Denver. It is estimated that 70,000 - 90,000 students will participate in this year's Talent Searches.

This year also marks the first time that The College Board has taken an active interest in the Talent Search phenomenon by informing all SAT test-site administrators that students who are younger than those who usually take the difficult examination will be doing so, in substantial numbers. In the remainder of this article, details regarding each university's Talent Search region, eligibility criteria, follow-up program options, and other related activities will be provided. Please refer to the map of Talent Search regions in this issue.[2]

ARIZONA STATE UNIVERSITY

Talent Search Region

U.S.A.: Arizona, California, Oregon, Washington, Alaska, and Hawaii
Canada: British Columbia, Alberta, Saskatchewan, Manitoba, and Ontario

Contact Person

Talent Search Administrator: Debbie Lawyer
Address: Project for the Study of Academic Precocity (PSAP)
Department of Special Education
Arizona State University
Tempe, Arizona 85287
(602) 965-1460
Director of PSAP: Dr. Sanford J. Cohn

Eligibility Criteria

96th percentile or better on either of the two most recent administrations of achievement, aptitude, or intelligence tests (subtests or total battery scores). Open to students in the seventh or eighth grades (or in higher grades, but of seventh-or-eighth-grade age)

Follow-up Program Options

Summer classes (commuters and on-campus residents)
Academic-year classes
Part-time early college entrance (concurrent enrollment)
Full-time early college entrance
Educational and personal counseling

Other Related Activities

Talent Search Award Ceremonies
Evaluation Clinic (for youths outside of the Talent-Search age range)
Research activities
Graduate Training Programs
Annual Training Conferences
Development of other special programs for gifted youths (e.g., for mathematically gifted girls, highly able minority students, and handicapped students)

DUKE UNIVERSITY

Talent-Search Region

North Carolina, South Carolina, Georgia, Florida, Alabama, Louisiana, Mississippi, Texas, Oklahoma, Arkansas, Kansas, Missouri, Nebraska, Iowa, Kentucky, Tennessee

Contact Person

Talent Search Coordinator: T.R. Curtin
Address: Talent Identification Program (TIP)
West Duke Building
Duke University
Durham, North Carolina 27708
(919) 684-3847
Director of TIP: Dr. Robert Sawyer

Eligibility Criteria

97th percentile or better on a nationally normed test of achievement. Seventh graders (or youths in higher grades, but of seventh-grade age)

Follow-up Program Options

Commuter Programs
By-mail fast-paced classes
Summer residential programs

Other Related Activities

Talent Search Award Ceremonies
Research
Training
Educational counseling and career advising for summer program participants
Advanced placement options

THE JOHNS HOPKINS UNIVERSITY

Talent-Search Region

Virginia, West Virginia, District of Columbia, Delaware, Pennsylvania, Maryland, New Jersey, Connecticut, Rhode Island, Massachusetts, New Hampshire, Vermont, Maine, New York

Contact Person

Dr. Bill Durden
Latrobe 305
The Johns Hopkins University
Baltimore, Maryland 21218
(301) 338-8427

Eligibility Criteria

97th percentile or better on a standardized in-grade achievement test, verbal, math, or composite. Seventh graders or students of seventh-grade age in a higher grade.

Follow-up Program Options

Counseling Guides
Summer commuter programs
Summer residential programs
Academic-year weekend programs

Other Related Activities

Talent Search Award Ceremonies
College counseling
Career counseling
Talent Search - The University of Hamburg and Americans Abroad

UNIVERSITY OF DENVER

Talent-Search Region

Colorado, Wyoming, Montana, Idaho, New Mexico, Utah, Nevada

Contact Person

Talent Search Coordinator: Dr. Holly Hultgren
University of Denver
Denver, Colorado 80208
(303) 753-3260
Director: Dr. Kenneth Seeley

Eligibility Criteria

95th percentile or better or 9th stanine on nationally normed achievement or aptitude test. Open to seventh or eighth grade students

Follow-up Program Options

Regional Awards Ceremony
Summer '83 residential program

Other Related Activities

University course options
Graduate training program
Academic-year commuter courses

NORTHWESTERN UNIVERSITY

Talent-Search Region

Illinois, Indiana, Michigan, Ohio, Wisconsin, North Dakota, South Dakota

Contact Person

Dr. Joyce Van Tassel-Baska
Northwestern University
School of Education
Evanston, Illinois 60201
(312) 492-3782

Eligibility Criteria

95th percentile or better on an in-grade standardized achievement test
Residing in Talent Search region
In grades 7 or 8 or highly able 6th graders

Follow-up Program Options

Regional Awards Assembly
Summer residential program
Summer commuter program
Academic-year commuter program

Other Related Activities

Counseling Workshops
Newsletter
Regional conference
State training activities
Research activities

[1]Dr. Cohn is Director of the Project for the Study of Academic Precocity (PSAP) at Arizona State University, where he also serves as Assistant Professor in the Department of Special Education. He is the publisher of the *Chronicle of Academic and Artistic Precocity.*

[2]"Talent Search Regions" map by Eric Gold, PSAP Research Associate.

PERSPECTIVES ON PERSONAL COUNSELING

*Peter M. Finlay, M.S.W.**

The field of personal counseling of highly able children and their families has recently been experiencing increased attention. This recognition seems to grow out of efforts on the part of program designers and counseling practitioners to identify and activate effective interventions tailored to meet the needs of this population.

As recently as only eight years ago the problems and dysfunctional adaptations of the highly able were viewed within the context of traditional counseling and therapy models; the consequence of using historically derived models to structure information gathering and interventions was singularly unsuccessful in establishing a track record of positive outcome and client satisfaction. In short, older, more familiar techniques did not resolve the needs and conflicts of the highly able.

RECURRENT THEMES AND PATTERNS

Over the past years, we have been collecting individual and family histories from this unique population, first with the support of the Study of Mathematically Precocious Youth (SMPY) at The Johns Hopkins University and during the past three years with the Project for the Study of Academic Precocity (PSAP) at Arizona State University. This information gathering has led to the identification of recurrent themes and patterns in the lives and adaptive responses of those highly able individuals who require counseling intervention.

The recurrent themes and patterns surrounding the lives of this population involve the interaction between the very natural early physiological developments of the highly able and the reaction of the family and the community to these developments. These developments include repeated reports from parents of the highly able of their early mastery of childhood hurdles such as walking, talking, toilet-training, and reading. When these precocious children met such developmental hurdles early or even skipped over them, parents reported that family, friends, and community professionals often reacted as if something were wrong, strange, or indicative of maladjustment about such excellent achievements and behaviors. Thus begins, too often, a continuing system of anxiety escalation within the family, with the emergence of self-doubt, insecurity, and amorphous feelings of wrongness about the child's true abilities. Eventually, in more extreme cases, when this misinformation is not corrected the marriage becomes tainted and the child enters school society ready to be defined as maladapted, requiring labels of emotionally handicapped and even mentally retarded. After several years of this kind of feedback and frustration, the members of the family are ready for treatment.

cont'd. on p. 4

Perspectives, from p. 3

COUNSELING AT PSAP

Counseling at the Project for the Study of Academic Precocity (PSAP) takes a very different approach to viewing the causes and effects of child and family dysfunction. We prefer to see the messages families with a precocious child receive about themselves from outsiders as messages formed around bad or insufficient information, a fear on the part of outsiders of children who do not appear to fit traditional developmental models, and a negative reaction to the child's lack of attraction to pressures for conformity and the meeting of expectations and predictions for behavior.

When the functionaries of social and educational institutions fail to get the response they need or understand from the highly able, there tends to be set in motion a series of reactions by them to redouble their efforts to achieve the student's conformity. The consequence to the child and family is that their natural, healthy levels of functioning are blocked and expressions of individuality are inhibited or punished. The processes of motivation and self-determination are curtailed and become transformed into maladaptive reactions on the part of the child. If this process is not checked and undone we tend to end up with highly able children who become socially and emotionally disordered adult members of the community; the prophecy of crazy, weird, criminalistic, and suicidal highly able adults is self-fulfilled under these circumstances.

Frequently, the most important thing counseling at PSAP can do is to set about educating its clients about the impact of early childhood experiences and messages upon present functioning. High ability is explained as a reasonable, healthy human expression growing out of easily understood facts and principles. Problems which had previously been defined by medical model terminology are now redefined into terms of gaining back control over one's feelings, actions, and responses through appreciation and acceptance of the healthfulness of highly able children's motivations. With support and direction for meeting these goals we see our clients grow to self-determination and eventually meet the responsibilities and opportunities of leadership and excellence toward which precocity tends to lead.

*Peter Finlay is a fulltime clinical practitioner with Family Service Agency of Phoenix, Arizona, and is consultant in programs and services for social and emotional development at PSAP. He received his Masters of Social Work from the University of Maryland's School of Social Work and Community Planning in 1976.

TIPS
(Tips for Intellectually Precocious Youth)

BRIDGING THE TRANSITION FROM HIGH SCHOOL TO COLLEGE[1]

Dr. Lynn Fox[2]

For many bright students, the senior year in high school is simply a period of marking time. The courses are not challenging enough and the pace of instruction is slow. Even worse, an able student who has accelerated his academic career is faced with the problem of having run through the complete high school curriculum in the area of his special ability. He will still, however, need a few last credits, especially in senior English, before being eligible to graduate. This situation can create an awkward problem that involves the school and school system as well as the student.

There are several ways to circumvent this situation. Basically, they all involve the concept of entering college early. The three most common variations on this theme are for an individual to attend college and high school at the same time; to compact a four-year high-school program into three, and so graduate early; or to come straight to college without the high school diploma. To utilize any of these methods, though, a student must be well motivated as well as intellectually able.

The first alternative is probably the least unsettling. Here the student takes only those high-school courses that are necessary for his graduation. At the same time, he takes one or two college courses a semester on released time or at night from a local institution. The college courses can be held in escrow until the person goes to college full-time. Thus he graduates from high school at the normal time but with the bonus of as much as half a year of college credit. He has the advantage of being able to enjoy his high-school atmosphere at the same time that he is challenging himself intellectually. Also, even if the individual is planning to do his full-time college work elsewhere, the credits are usually transferrable if the grades earned are high.

The second variation is to condense one's high school program into three years and thereby be graduated from high school a year early. Usually the senior-year credits, such as English, are taken during the junior year or during the summer session. Another possibility is for the person to take college courses which specifically fulfill the high school course requirements, such as replacing high-school Calculus with a college course in Calculus. The key to this alternative is that the school must be flexible in allowing students to arrange their programs. Without the cooperation of the school and school system, graduating early is impractical.

The final alternative is to come directly to college at the end of the tenth or eleventh grade without the high-school diploma. While this may sound like an extreme measure, it actually has become fairly common for highly able students. In fact, quite a few colleges and universities have set up specific programs and procedures for students who wish to come at the end of the eleventh grade. In several states the rules of the State Boards of Education allow one year of college credit to be substituted for one year of high school credit, thus the high-school diploma is received at the end of the freshman college year.

In the early 1950's the Ford Foundation published the results of a study of early entrants to college. They investigated 130 students who had entered at the average age of 16 years and 6 months. The findings were extremely positive. Self-reports indicated that the students did not generally feel handicapped by having left high-school early. In many cases they were glad to have escaped a boring classroom atmosphere. When these students were followed up, it was found that the majority of them still endorsed early entrance as a viable alternative to the high-school senior year. Social and emotional aspects were studied by Dr. Richard Pearson and Dr. Dana Farnsworth. Their results led them to conclude that these individuals adjusted to campus life as well as their comparison group of classmates. Reasons for those who did fail were not different than the ones normal-aged college students who failed gave. Academically, the mean grade-point average of the early entrants was higher than that of the general student population. They also received more honors and awards than did the comparison group of college students who did not enter early.

[1]Reprinted from the *ITYB (Intellectually Talented Youth Bulletin)*, Vol. 2, No. 10 (July 15, 1976), p. 2.

[2]Dr. Fox is Professor of Education in the Evening College of The Johns Hopkins University.

BOOK REVIEW:
Free Enterprise Forever!
Scientific American in the 19th Century

James Shenton, Editor

*Craig Blurton**

From its debut August 28, 1845, as the "Advocate of Industry and Enterprise, and Journal of Mechanical and Other Improvements" until the present, *Scientific American* has been one of the premier science magazines. Indeed, for many years, *Scientific American* was the only journal in the United States devoted purely to "science and mechanics."

For the budding young scientist, historian, mechanical hobbyist, inventor, in fact any person with a healthy curiosity about any of these subjects, this volume, edited by James Shenton and published in 1977 by Images Graphiques of New York, will be a delight. Shenton has reproduced, full-sized, representative pages and graphics from the *Scientific American*, which were published between 1845 and 1900, and has provided the reader with a brief history of the magazine's owners.

From the first page of the first issue published by Rufus Porter, "a strange, many sided genius" who sold the publication after 10 short months to Orson Munn and Alfred Beach when they were both barely at the end of their teenage years, through the final issue of the nineteenth century, the magazine chronicles the mechanical and scientific inventions and discoveries which accompanied the growth of America and the success of the free enterprise system.

Volume one, number one, includes a front page illustration of "Improved Rail-Road Cars," a poem written by Rufus titled "Attraction," and an article about the "Cause of Sound in Thunder."

Other items of interest include the journal's commentaries on the Civil War, the illustration of President-Elect Abraham Lincoln's patented "apparatus for buoying vessels," the construction of the Brooklyn Bridge, and the advertisements, including one for "Talking Machines" (phonographs).

*Craig Blurton is Editor of the *Chronicle* and a third year doctoral student specializing in the area of science education and the gifted child.

AMERICAN EDUCATION SUFFERS BY COMPARISON*

A close look at the competition - in this case, Japanese and Soviet schools - has alarmed American educators and inspired calls for greater rigor in the nation's classrooms. Concern over Japanese technological advancements and hints of a Soviet workforce with superior scientific and technical skills have focused attention on U.S. elementary and secondary curricula, which pale when compared with those in Japan and the U.S.S.R. Treatment of the gifted, too, has been singled out for discussion, and again the U.S. system does not compare favorably.

Izaak Wirszup, a professor of mathematics at the University of Chicago, has made a thorough study of math and science education in the Soviet Union and reports that a 15-year emphasis on those subjects has resulted in a school program that far outstrips what is found in American institutions. As a result of the U.S.S.R.'s superior curriculum, says Wirszup, about 98 percent of the Soviet young people graduate from secondary schools each year, compared with 75 to 85 percent in this country. And in 10 years of formal schooling, says Wirszup, the Soviets cram in much more than American schools offer in 13 years. For example, a typical compulsory curriculum for a Soviet student includes arithmetic in grades 1 through 3, arithmetic and algebra in grades 4 and 5, algebra in grades 6 through 10, calculus in grades 9 and 10, geometry in all grades, five years of physics, four years of chemistry, one year of astronomy, five and a half years of biology, five years of geography and three years of mechanical drawing. Electives offer a variety of more intensive work in the sciences and math.

Compared with what would be considered a demanding curriculum in this country, the Soviet graduate has had one to two years more training in algebra, eight years more in geometry, one to two years more in calculus, four more years in physics, three more in chemistry, three and a half more in biology, one more in astronomy and three more in mechanical drawing.

A similar relationship exists between education in the U.S. and in Japan, a nation that is moving from a highly industrialized to a highly technical economy and is moving its education system in the same direction. It invests heavily in keeping its science and math teachers up-to-date, and when compared with the United States, it is "much better equipped to produce workers for the economy of the future, which requires high levels of math, science and technical skills," according to Stanford School of Education professor and president of the California State Board of Education, Michael Kirst. Japanese children, says Kirst, "work much harder on academic tasks than their American counterparts," and, he points out, 92 percent of them complete high school.

Like Japan, the Soviet Union makes rigorous demands on its students. It also requires a much higher level of training for its teachers than that found in the U.S. In the United States, most elementary school students are taught math by classroom teachers, in a "boring" way that is a "terribly damaging experience to American youngsters," says Wirszup. In Russia, elementary school teachers in grades 1 through 3 get extensive training in math, including five years of algebra, ten of geometry and calculus. Beginning in the fourth grade, Soviet students are taught by specially trained math teachers, whose background, Wirszup calculates, is at least equivalent to that of a master's degree program at an American university.

Wirszup finds America's means of educating its gifted and talented youngsters equally wanting: "Ideally, [our gifted students] are our future leaders in every field, but we do not equip them for such responsibility," he says. "Gifted students are all too often allowed to manage alone under the misguided belief that their natural abilities will see them through."

The Soviets, notes Wirszup, do not feel they are acting contrary to their social theories by having a school system that offers maximum education to the many, while training the most able for top positions in science, technology, and the military. The goal is the same in this country, but it has not been carried out with the same commitment.

U.S. business executives and government officials are concerned about the impact of other countries' technological expertise on the American economy and national security. Wirszup suggests that with increased attention being paid to the problem, the quality of the nation's schooling will improve, as it did after the launch of *Sputnik* in 1957.

Kirst and Wirszup note that there are problems with the Japanese and Soviet models of education and that improvements in the American system must be appropriate to this nation's cultural and civic values. Bearing that in mind, Kirst points out that much of what happens in this country depends on public attitudes and activism, putting the ball back in your court. "The schools in the United States cannot stimulate the necessary student willingness to tackle difficult science and math courses without stimulus from parental and public opinion."

*Reprinted with special permission from *Gifted Children Newsletter* (Vol. 2, No. 6) June, 1981, Gifted and Talented Publications, Inc., P.O. Box 115, Sewell, NJ 08080.

APP CREDITS: TIME AND MONEY SAVERS

The Advanced Placement Program (APP), sponsored by The College Board and administered by the Educational Testing Service (ETS), provides the intellectually able student with the opportunity to pursue college-level studies while still in high school. This enables the student to accelerate his or her progress through an undergraduate degree program saving time and hundreds, perhaps thousands, of dollars.

Each May, students who have taken APP courses at their high school or, if APP courses are unavailable, studied independently, take one or more of twenty-seven APP examinations which are graded on a five point scale: 5, extremely well qualified; 4, well qualified; 3, qualified; 2, possibly qualified; or 1, no recommendation. Participating colleges then grant placement and credit to students presenting qualifying grades, most recognizing rankings of three and above.

An ambitious student can accumulate enough APP credit to enter a college or university with sophomore status thereby saving an entire year's tuition, which can be a considerable sum of money at some of the more prestigeous institutions, and shaving an entire year off of the time required to earn an undergraduate degree. The latter is important in light of research which indicates that talented mathematicians and scientists tend to do their most creative work before thirty.

Examinations are offered in History of Art, Studio Art: General Portfolio, Studio Art: Drawing, General Biology, General Chemistry, English Language and Composition, English Composition and Literature, French Language, French Literature, German Language, German Literature, American History, European History, Latin Lyric, Vergil, Calculus AB, Calculus BC, Music Listening and Literature, Music Theory, Physics B, Physics C: Mechanics, Physics C: Electricity and Magnetism, Spanish Language, and Spanish Literature.

Most of the examinations are scheduled for three hours and contain multiple-choice and essay type questions. Essays, problem solving questions, and studio art are evaluated by more than 750 selected college professors and APP teachers with a typical booklet being rated by at least four professors or teachers who are not in communication with each other.

Even though practically every accredited four-year college or university and many two-year institutions recognize APP credit, it would be wise to send for *College Placement and Credit by Examination* to study the specific policies of the institutions you are interested in attending after high school graduation. In addition, publications entitled *Beginning an Advanced Placement Course* and *Grading the Advanced Placement Exam* are available and include course descriptions for the various subject areas. These, and a booklet describing each subject are available by writing Publications Order Office, College Entrance Examination Board, Box 592, Princeton, New Jersey 08540.

If you are interested in taking APP courses or preparing independently for an examination, see the APP coordinator at your high school. If no such individual has been appointed, the department chairpersons should be well informed about APP matters in their subjects. Failing both of those, the student may need to deal directly with the APP office by writing: Advanced Placement Program, College Entrance Examination Board, Princeton, New Jersey 08540.

CORRFCTION

In the last issue of the *Chronicle of Academic and Artistic Precocity* (Vol. 1, No.'s 4&5 combined) we incorrectly listed Dr. Daniel Keating ("Four Faces of Creativity") as being an Associate Professor in the Institute of Child Development at the University of Minnesota when in fact Dr. Keating has taken a new position as Associate Professor of Psychology at the University of Maryland, Baltimore County Campus. Our apology to Dr. Keating for the mistake.

COLLEGES: WHICH ONE IS RIGHT?*

In the United States nearly half of the students who are graduated from high school enter some type of college. (Fewer in other countries do, and their admissions procedures are varied.) Many attend a nearby institution that is supported largely by the state or community - a state college, state university, community college, or junior college. Quite a few enroll in private colleges or universities either fairly close to their homes or as much as three thousand miles away. Some students attend a public college or university outside their own state.

Many factors help determine a student's choice of college. Important among these is the type of curriculum desired, such as liberal arts, business, engineering, fine arts, pre-medicine, pre-law, and preparation for graduate study leading to the Ph.D. degree. Hardly any college or university is equally good in all these areas. Great stress on one aspect may weaken other curricula. For example, a splendid technical institute is not likely to emphasize liberal arts as effectively as an excellent college can.

Besides differing greatly in curricula offered, colleges can be classified according to type of support (public vs. church vs. private nonchurch), cost, ease of admission, distance from the student's home, size, number of male vs. female students, intellectual and social atmosphere, athletic opportunities available, and the like. Usually it will repay a potential applicant to consider each such factor carefully before narrowing his/her choice down to several colleges.

Some colleges are more "selective" than others - that is, they have higher entrance requirements. Almost any high school graduate can readily gain admission to the nearby community college. State colleges and state universities usually admit a large percent of the in-state applicants, but some of them are far more selective than others. A few private colleges such as Swarthmore and Oberlin have several times as many excellently qualified applicants as they can house and teach. Even rather large institutions such as Stanford University, Harvard University, the Massachusetts Institute of Technology, and the University of California at Berkeley may have to turn away most applicants.

The admissions officers of most selective colleges pay great attention to a student's high-school grades and, when available, rank in graduating class. Second in importance are scores on national examinations or occasionally on tests administered by the college itself. There are two main national examinations, those administered since the turn of the century by the College Entrance Examination Board (CEEB) and those begun more recently by the American College Testing Program (ACTP). Some colleges require that certain CEEB tests be taken. Some specify the ACTP battery. Some will accept either, and some require neither. A high-school junior, or senior in the early fall, will be wise to check each college of his/her choice for its CEEB and/or ACTP requirements, because these tests must be registered for in advance.

Selective private colleges often require that the CEEB's Scholastic Aptitude Test (SAT) be taken before Christmas in the student's senior year or earlier. Many of them also require that three CEEB achievement tests be taken in subjects such as English Composition, a foreign language, mathematics, a science, or history. Practice materials for these tests are provided by the CEEB. Commercially prepared manuals or courses are usually not especially helpful, despite strong claims made for them.

Excellent preparation for the SAT is provided at low cost by the CEEB's Preliminary Scholastic Aptitude Test (PSAT), which is administered in most high schools especially for eleventh graders each October. Because the PSAT is also the qualifying test for the National Merit Scholarships, it is desirable that every fairly academically able student take it.

The ACTP battery consists of four tests: English, Mathematics, Natural Science Reading, and Social Studies Reading. They are used as one basis for selection at many state and private institutions, particularly in the Midwest. The four tests cover more than the SAT does, but less than the whole range of CEEB tests. They probably predict about as well as CEEB tests do, except perhaps among the ablest students. Those who have a choice of which set of tests (CEEB or ACTP) to take for a certain college should discuss the matter with their college counselor or some other knowledgeable person.

Unless the student's high-school grades and test scores are both excellent, however, admissions officers of most selective colleges will look for evidence of distinctive achievements indicating creativity, leadership, or originality. If these are missing, the applicant may have to settle for a less selective college.

Most colleges cannot afford to be very selective. State or local schools have obligations to the children of the citizens of their state, county, or city. With rising tuition charges, few private schools attract so many well-qualified applicants that they can reject any but the obviously underqualified. Thus there is, almost literally, at least one college opportunity available to all but the most academically least effective students. One should apply to a wide range of colleges, up to about five, so that she/he will be virtually sure to gain admittance to at least one.

Various college handbooks, especially that published by the CEEB (Princeton, New Jersey 08540), can help students learn about colleges. So can the college counselor in a high school. The colleges themselves will usually provide information and answer questions. They also welcome visitors to their campuses, preferably by appointment. If a student starts thinking about college in September of the eleventh grade, by the next fall she/he should be ready to narrow the choices down to a few.

If one intends to be graduated early, such as by combining the twelfth grade with the eleventh, one should start planning in the tenth grade. Some colleges such as the University of Chicago and The Johns Hopkins University welcome excellent students who want to leave high school without a diploma after the eleventh or even the tenth grade. This requires advance planning, too.

*This article is reprinted from the *ITYB (Intellectually Talented Youth Bulletin)*, Vol. 2, No. 10 (July 15, 1976), pp. 3-4.

TAPS (TIPS FOR ARTISTICALLY PRECOCIOUS STUDENTS) THIRD ANNUAL ART COMPETITION ANNOUNCED

The Third Annual Interlochen National Youth Art Competition for grades 7 and up, sponsored by the Interlochen Center for the Arts, will be accepting entries until April 1, 1983. The contest offers cash prizes, extensive publicity, public exhibition at a prestigious arts center, and scholarship opportunities to winning competitors.

The competition, open to all media, is juried from 35mm slides or photographs. The $5.00 entry fee covers up to six works of art from an eligible seventh through twelfth grade student. Eligibility is restricted to students residing in the United States and not enrolled at the Interlochen Arts Academy and who are not entering work executed at the Academy's sister institution, the National Music Camp. Students will be notified of acceptance or not by April 15, 1983. For contest rules and an entry form, write: Lary Lien, Chairman, Visual Arts Division, Interlochen Arts Academy, Interlochen, MI 49643.

TAKING SUMMER COLLEGE COURSES*

One question that many students wonder about is whether to take a college course while still in junior or senior high school. The answer is: yes, many students are eligible if they have a high enough Scholastic Aptitude Test (SAT) score and are really interested in learning in a college atmosphere. Here is an opportunity to earn college credits for a course that stimulates intellectual abilities. The student seeking such an experience must be willing to study the course work and conscientiously do the homework in a systematic fashion. No one should take a college course if not able and eager to earn a letter grade of at least "B."

Students eager to take a college course this summer should first consider the previously mentioned criteria. Then call the local college **immediately** and request a summer course catalog. After receiving the catalog, the pupil should look over the basic course offerings and select those courses that interest him and that he feels qualified to handle. If verbal interests are strong and the student has earned a score of at least 550 on the verbal section of the SAT, that person might consider general psychology, political science, political economy, history, or an introductory English or foreign language course.

Those who know some algebra and have a strong aptitude for mathematics, as demonstrated by an SAT-Mathematics aptitude score of at least 550 while still below the 11th grade, would seem qualified to take an introductory computer science course. This has been, from our experience, an excellent first college course. Those who have completed two years of algebra and a year of plane geometry and whose SAT-M score is at least 550 could probably handle a college algebra and

trigonometry course. For those individuals scoring over 600 on the SAT-M the pre-calculus mathematics sequence followed by calculus might be appropriate.

These suggestions are only tentative, dependent greatly on the selectivity and curriculum of a given college. What is right for one individual may not be for another. Other courses which may be of interest include astronomy, biology, geology, and physical geography.

After choosing a course which seems suitable, students may contact Dr. Sanford J. Cohn at (602) 965-4757 if they wish to discuss it with him or get help in registering for it. Registration to take summer courses for many colleges is in May. If a person is interested, he should act soon. This may be one method of enjoying the summer while earning college credits at the same time.

Finally, if an individual's SAT scores are lower than the suggested criteria, he should take the Scholastic Aptitude Test again during a regular administration. Applications can be obtained from Educational Testing Service, Princeton, New Jersey 08541. After receiving these scores, please report them to us via a xeroxed copy of the score report. Then we can discuss the possibilities regarding suitable college courses.

*This article is adapted from *ITYB (Intellectually Talented Youth Bulletin)* Vol. 1, No. 8 (April 15, 1975), p. 2.

MARIE CURIE: FOR THE PLEASURE OF KNOWING MORE

*Sherrie Ann Rubink**

"'I really like learning things,' she would say, 'I like it very much.' She thought to herself that she was going to study all of her life, just for the pleasure of it, the pleasure of knowing more" (Eberle, 1942, p. 20). These feelings were expressed in childhood by the only investigative research scientist to be awarded the Nobel Prize in both physics and chemistry, Marie Curie.

Born November 7, 1867, the youngest of five children of Vladislav Sklodowska, a professor of mathematics and physics, and Mme Boguski, the director of a private school for girls in Warsaw, Poland (Curie, 1938, pp. 5-6), Marie had an excellent memory and could read at age four:

> One morning, while Bronya (her older sister) was faltering out a very simple reading lesson to their parents, Manya (Marie) grew impatient, took the open book from her hands, and read aloud the opening sentences of the page. At first flattered by the silence that surrounded her, she continued this fascinating game; but suddenly panic seized her. One look at the stupified faces . . . a few unintelligible stammers, an irrepressible sob . . . [then] "Beg Pardon! It's only because it was so easy!" (Curie, 1938, p. 47)

Her family was afraid of her precocity and did not encourage her at this time. Later when she was old enough to go to school, a frightened Marie was required as the most brilliant pupil in her class to recite before the government inspector. Although two years younger than her classmates, she was first in ciphering, history, literature, German, and French (Curie, 1938, pp. 18-20).

Marie's mother died when Marie was ten but her father provided an atmosphere of rare intellectual stimulation in his home. Each Saturday he, his son, and three daughters would share literature. M. Sklodowska could read Greek, Latin, English, French, German, Polish, and Russian, and would translate the finest works of foreign authors to his children. He also tried to keep up with the progress of chemistry and physics through publications he secured with considerable effort (Curie, 1938, pp. 48-49). On June 12, 1882, Marie graduated from the government gymnasium winning the gold medal for her scholarship. This was the third gold medal won by the Sklodowska children and, although her teachers said she was "remarkably gifted" and a "brilliant student," she may not have seemed different in the Sklodowska home (Curie, 1938, p. 47).

Eight years passed before Marie entered the Sorbonne. Girls were not allowed to go the Tsar's University in Warsaw and there wasn't enough money for both she and Bronya to attend the Sorbonne together. Marie worked as a governess and as a tutor helping Bronya and saving her money. She read borrowed books, learned through correspondence with her father, and attended "floating" university classes. She had a fascination with physics and a desire to learn. While attending the Sorbonne she ate little and lived frugally, stretching her money to stay in school as long as possible. She studied hard, loved mathematics and physics, and had a taste for perfection (Curie, 1938, p. 61-115).

The highlights of Marie's accomplishments were first in the Order of Merit in the master's examination in physics, 1893; second in the master's examination in mathematics, 1894; first in the examination for a fellowship in secondary education, 1896; plus a monograph on the magnetization of tempered steel (Curie, 1938, pp. 113-135). In addition, she had married the well known French physicist Pierre Curie and had her first child, Irene, September 12, 1897 (Curie, 1938, p. 135; 150).

In 1897, at 30 years of age, Marie began looking for an original research subject for her doctoral thesis. After reading the work of H. Becquerel in which he observed but did not know the nature or source of rays in uranium, Marie decided that here was an engrossing subject to study. Pierre Curie agreed. Using methods developed by Pierre and his brother, Marie began work. Pierre advised her and soon began working with her (Curie, 1938, p. 153). April 12, 1898, the Curies announced the probable presence of a new element with much radioactivity (Curie, 1938, p. 156). December 26, 1989, they announced the existence of radium, the source of the rays. However, knowing it existed was not enough. A small quantity had to be produced in pure form and weighed by scientific methods. It wasn't until 1902, 45 months after the announcement of its probable existence, that Marie finally succeeded in preparing a decigram of pure radium and was able to make a first determination of its atomic weight (Curie, 1938, pp. 161-169). Four years of hard, careful, determined work had been done in an old shed that had no floor and was hot in summer and cold in winter, in order to carefully boil down a ton of ore and prepare a fraction of a gram of radium of high purity. At last, Marie wrote her doctoral thesis on radium and received her degree June 25, 1903 (Curie, 1938, p. 201).

In 1903, when she was only 36, Marie, Pierre, and H. Becqueral received the Nobel Prize for their work with radium. The Curies had worked long and hard, publishing 32 scientific communications either together or in collaboration with other colleagues between 1899 and 1904 (Curie, 1938, p. 193). They did not take a patent but freely published the results of their research and the process of the preparation of radium.

Marie and Pierre continued to work together on their research. In 1904 Eve, their second daughter was born but, tragically, Pierre was killed in an accident in 1906 (Curie, 1938, 245-253). Marie, at 38, was appointed to her husband's chair of physics at the Sorbonne, marking the first time in French history a woman had been given a position in higher education (Curie, 1938, p. 253).

From this time until her death, except during the years of World War I, she divided her time between being a parent, a professor, a researcher, and a laboratory director. In 1911, she received the Nobel Prize in chemistry for research with radium and its compounds. From 1919 until 1934, she gave greater time to her roles as teacher and laboratory director. Four hundred eighty-three scientific communications and 34 theses were published by the physicists and chemists under her direction, 31 of which were her own (Curie, 1938, p. 364). In 1934, shortly before her death, two students under her direction, her daughter Irene and her son-in-law Frederic Joloit, discovered artificial radioactivity for which they would eventually receive a Nobel Prize (Curie, 1938, p. 367).

It almost seems natural that someone with Marie's brilliant mind and astounding perseverance, in combination with the mentorship of her father, would make such a great contribution to society. She had the capacity to be completely absorbed in her work. Jean Perrin has said about her, "Mme Curie is not only a famous physicist; she is the greatest laboratory director I have ever known" (Curie, 1938, p. 364). The little girl who had said "I really like learning things" had taught the world a great deal.

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RESOURCES

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Gifted Females: Are We Meeting Their Counseling Needs?[1]

Lynn H. Fox and Lee J. Richmond[2]

Career counseling in the school is concerned with the needs and developmental tasks of all students, yet little is known about the special needs of the gifted. In the professional literature on counseling there is little material related to counseling the gifted with the exception of the gifted underachiever (Wyne & Skjei, 1970). There is also evidence (CAPS Capsule, 1978) that attention is presently called to the counselor's role in child abuse of the gifted because the gifted are perceived by some parents as different and unlikely to respond in the accepted manner. Isaacs (1973), however, delineates the need for career counseling for gifted achievers. These students have so many directions in which talent and superior ability exist that career decision making becomes a formidable task. Conflicting and changing views of appropriate roles for women make career counseling for gifted young women even more crucial.

The editorial in the fall 1977 issue of *The Gifted Child Quarterly* presents an interesting challenge to counselors (Gowan, 1977). The editor calls for counselor empathy toward the "individual and idiosyncratic characteristics of the gifted" but compares guidance of the gifted to Christianity in that "it really hasn't been tried on an effective basis by people who are prepared to practice it."

To meet the individual and idiosyncratic counseling needs of the gifted, particularly of gifted young women, counselors must turn to researchers for guidance. One such group of researchers is the IGCSG (The Intellectually Gifted Child Study Group) Evening College and Summer Session of The Johns Hopkins University. This group has delineated three major factors related to sex differences in achievement, particularly with respect to gifted students' taking mathematics courses. The first factor is related to differential career interests and expectations, the second factor is related to encouragement from significant others, and the third factor to early identification of the gifted student. Each of these factors has implications for sound counseling practice.

INTERESTS AND EXPECTATIONS

In a study of well-above-average-ability female students who elected or did not elect to take high school mathematics courses, Haven (1972) found that the two most significant predictors of course taking were the perceived value of mathematics for future studies and careers and greater interest in the natural sciences than in social studies. Female students who elected to take advanced courses in mathematics did so because they saw the courses as directly relevant to their career goals. Thus, differential course taking and related achievement of female students in mathematics are related to differential career interests and aspirations. Presumably, these career interests and aspirations are influenced by social and cultural pressures.

Male and female students who exhibit high academic potential differ dramatically in career interests and aspirations as early as seventh grade. More male than female students aspire to mathematical and scientific careers (Fox & Denham, 1974; Fox, Pasternak & Peiser, 1976). Not surprisingly, gifted male students perceive the study of

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PSAP: IT'S STRUCTURE AND FUNCTIONS

Sanford J. Cohn, Ph.D.•

PSAP is essentially a "research through service" program, which also serves as the field-training site for graduate degree (M.Ed., M.A., and Ph.D.) matriculants who are specializing in the education of the gifted. There are three layers to PSAP: service, graduate training, and research.

SERVICE

PSAP offers services involving assessment and educational facilitation to highly able youngsters of virtually all ages. Assessment activities fall under two categories: the Talent Searches and the evaluation clinic.

Based on the work of Julian C. Stanley, Director and Founder of the Study of Mathematically Precocious Youth (SMPY) at The Johns Hopkins University, the Talent Search focuses on youths of junior-high-school age (roughly 12-and-13-year-olds). Those students who are in the seventh or the eighth grades (or in higher grades but of seventh or eighth grade age) and who are performing in the top ranges relative to their age group on tasks involving mathematical and/or verbal reasoning ability are invited to take The College Board's Scholastic Aptitude Test (SAT). Those students who take the SAT as Talent Search participants are provided with a detailed interpretation of their scores on the various sections of that test relative to other highly able youths of their own age and with information about educational alternatives that might be appropriate for them to pursue. Information about the location of such educational alternatives is also provided them. All Talent Search participants receive, at the very least, a certificate of participation; high scorers earn special certificates noting their outstanding achievements and book prizes; and the top scorers earn special awards, including single-course college-tuition scholarships to be used prior to their full-time entrance to college. More than 12,200 youths took part in PSAP's "1983 Western States and Canadian Provinces Talent Search."

For youngsters who are either too young or too old to take part in the Talent Search activities, PSAP offers the assessment services of its Evaluation Clinic. There is no age requirement; however, the child must be able to read sentences. The youngest child who has been tested in PSAP's Evaluation Clinic to date is a two-and-a-half-year-old boy who was reading at the end-of-third-grade comprehension level on tests designed for third graders. Up to ten hours of advanced-level tests are administered to youngsters who come to the clinic. Once the tests are scored, item analyses are performed and the results are used to develop an Individualized Educational Program (IEP) that is based upon a detailed profile of the youngster's abilities and assessed skills (at whatever advanced level the child is performing). The results are interpreted by PSAP staff members in a family consultation setting. Educational implications of the assessment results and options that are currently available to the family are also discussed. When necessary, PSAP also works with school officials in helping to implement the IEP.

During a six-week summer program at Arizona State University, rigorous academic classes in mathematics, expository writing, com-

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puter science, Latin and Greek in modern-day usage, and laboratory science are offered to Talent Search participants who qualify by virtue of their performance on the SAT. In addition, several counseling workshops are provided, covering such topics as educational planning, communication skills, study skills, and career exploration. Analogues of the mathematics and writing classes are offered to younger students as well (roughly ages 7 through 11 years), in addition to classes in Spanish language, science exploration, and reading the classics. Some classes in mathematics, expository writing, Latin, and Advanced Placement English Language and Composition are offered during the school year for both the younger and older students. (Usually these youngsters are released from their regular class in school and allowed to do their homework assignments from their PSAP class in that particular subject.) For those youngsters who demonstrate the necessary homework skills and study behaviors, as well as the prerequisite subject-matter skills, college courses are arranged on a part-time basis. In rare instances PSAP helps some youths enter college early on a full-time basis, as well. In general, PSAP staff members are available for educational counseling to all participants in any of its assessment and facilitation activities and their families.

PSAP has actively pursued the proliferation of similar university-based programs in other locales throughout its Talent Search region. To date four other university-based programs have been stimulated by PSAP via its annual Training Conference and subsequent consultation. These programs include the following universities: University of California at Berkeley, University of California at Irvine, California State University at Sacramento, and University of Washington (Seattle). Because of this outreach activity a larger percentage of participants in PSAP's talent searches have access to educationally facilitative opportunities than participants in any other similar program throughout the country (i.e., those at Johns Hopkins, Duke, Northwestern, and University of Denver).

PSAP also works with many school districts and private schools throughout the nation to help them develop academically challenging programs for their highly able students. This work is facilitated by means of its Annual Training Conferences and a growing network, entitled PSAP's Cadre for School-Based Programs, as well as through individual consultation with school personnel.

GRADUATE TRAINING

All of the classes offered to highly able youngsters on the ASU campus serve as training and observation sites for graduate students who are taking practicum coursework, internships, or pursuing advanced-level degrees. The Department of Special Education offers three degrees, a Master of Education, a Master of Arts in Education, and a Doctor of Philosophy in Education, with specialization in the education of the gifted. To date eight graduate courses concerning the education of gifted children have been developed.

RESEARCH

The driving force behind all of PSAP's service activities is a life-time longitudinal research program, which will follow all participants in PSAP's assessment and educationally facilitative activities throughout their academic careers onward through adulthood. These longitudinal follow-up studies are designed to determine the ultimate effectiveness (or lack thereof) of the various strategies developed and implemented by PSAP. In essence, from the start of its activities PSAP staff members have been engaged in evaluation of all of its activities. This evaluation is planned to extend far into the future. Evaluation studies of the graduate training components are also being conducted. PSAP's initial three-year follow-up study has recently been funded via an ASU Faculty-Grant-in-Aid. It will be conducted in late spring 1983.

PSAP also engages in research of a more basic nature. To date seven studies have been conducted concerning such topics as cognitive processing characteristics of verbally able students, the nature of differences between verbally able bilingual and monolingual youths, reaction time and intelligence among highly able students, the effectiveness of a variety of mnemonic strategies among verbally able youths, and sex differences in mathematical reasoning ability. An investigation into the nature of the relationship between myopia and intelligence among highly able children and their families is currently being planned.

Currently underway is a book, entitled *The Optimal Match Strategy: Providing appropriate educational experiences for intellectually gifted children and youths*. A proposal has been submitted to the ASU Centennial Committee for this book to be published as one of ASU's Centennial works. This volume will have two sections, the first will focus on PSAP's program rationale and procedures, and the second on the four-year data base out of which those rationale and procedures have evolved. In essence, then, this volume will serve to archive all of the evaluation studies, the "pedagogical research" we have accumulated to date. Articles are currently being prepared for submission to journals concerning the sex difference studies, the cognitive processing studies, and the reaction time studies. Several manuscripts concerning case studies with regard to educational counseling have been submitted, and one has already been published.

The presence of a population of operationally well defined subjects, who are quite eager to take part in studies designed to help them learn more about themselves and others like them, certainly stimulates interest among professional colleagues and graduate students to undertake interesting research activities.

FUNDING

All of PSAP's programs are self-supported. That is, participants pay fees to take part in the assessment and educational opportunities. A large portion of our operating budget, however, is devoted to providing scholarships for those youngsters who could not otherwise take part.

Much of the pedagogical research is funded on a "bare bones level" by means of program fees. We feel that this is justified as a form of "quality control" for the educational services they are receiving. Funds for research into more basic questions are sought from both university and outside funding sources. Financial support is desperately needed for PSAP to implement effectively its planned program of research activities and to provide scholarship support for financially hardshipped students to attend its classes and workshops.

*Dr. Cohn is an Assistant Professor in the Department of Special Education at Arizona State University, Director of the Project for the Study of Academic Precocity (PSAP), and Publisher of the *Chronicle of Academic and Artistic Precocity*.

GIFTED FEMALES, from p. 1

mathematics as relevant to their future goals more frequently than do gifted female students (Haven, 1972; Fox 1975a).

Academically talented female adolescents also differ strikingly from adolescent girls in general with respect to career interests. In a study using the Strong-Campbell Interest Inventory (Fox, Pasternak, & Peiser, 1976), gifted female students showed much stronger interest in science and mathematics on the general-interest scales than a random group of male and female adolescents did, but still less interest than gifted male students. Female students who have well-above-average mathematical ability are attracted to both masculine and feminine career areas. Thus, the female students who have the greatest potential for achievement in the physical sciences and mathematics may experience more conflict in career decision making than less able female students or very able male students. The underlying values of gifted female students are also less consistent with their intellectual talents. The majority of women in any sample tend to score higher on measures of social values and lower on measures of theoretical values than men in the Allport-Vernon-Lindzey *Manual for the Study of Values* (1970), and this finding is true for gifted girls as well. Gifted boys, however, tend to score low on the social-value scale and high on the theoretical-value scale, which is consistent with mathematical and scientific endeavors (Fox, 1976a).

Although why the interests of male and female students differ so greatly as early as grade seven is not clear, many social and cultural influences help to reinforce these differences. For example, females are rarely portrayed in textbooks or by the media as competent and intellectually aggressive or in positions of prestige and authority. The support of significant others in a young girl's life may be crucial for resolving this conflict.

SUPPORT OF SIGNIFICANT OTHERS

Haven (1972) found that girls who did elect to take mathematics courses in high school were those who received encouragement from parents, guidance counselors, mathematics teachers, and peers. Studies of women who have doctorates (Astin, 1969) and women mathematicians in particular (Helson, 1971) indicate that identification with the father, encouragement from teachers, and support of parents were important in the academic development of these women.

In general, how supportive are parents, teachers, and peers of female students' interest in mathematics? In a study of a small sample of mathematically gifted students, Astin (1974) found that parents of male students were more likely than parents of female students to have noticed and fostered their child's scientific interests. Gifted male students are more likely than gifted female students to perceive their parents as favorable to their taking accelerated mathematics courses (Fox, 1975a). Informal observations of counseling situations suggest

that the differential perceptions of parents' attitudes are correct.

Whether or not gifted girls receive special encouragement at home to aspire to careers in the sciences, they are not likely to get science career counseling at school or to get much encouragement from teachers. Because many teachers believe that male students are inherently better at mathematics and science than female students (Ernest, 1975), they are not likely to notice and encourage talented female students. Casserly (1975) found that some high school guidance counselors admitted to discouraging gifted young women from pursuing advanced mathematics and science courses because in the counselors' view careers in science and mathematics were not realistic pursuits for women.

Even in these supposedly liberated times, gifted girls may find little support from peers for showing interest and aptitude in mathematics. Many gifted female adolescents anticipate peer rejection for accelerating their progress in mathematics (Fox, 1974a,b). Solano (1976) found that the young women's fears are justified. Both teachers and peers have a negative view of mathematically gifted girls.

In a study of Wisconsin high schools, Fennema (1976) found sex differences in mathematics achievement in schools where students tended to label mathematics as a male domain but no sex differences in achievement in schools where mathematics was not stereotyped as masculine. A study of female college students found that those majoring in mathematics and the sciences were less likely to view these areas as unfeminine than were women majoring in the more traditionally female areas (Hawlay, 1972). Thus, the perception of mathematics as a male domain affects female aspirations and is undoubtedly influenced by parents, teachers, and peers. The problem seems circular. Female students tend to avoid advanced courses in mathematics and science in high school, college, and graduate school because they perceive these areas as masculine or unrelated to their career goals. . . . long as they avoid the courses as girls, as women they will be unable to compete for careers in math and science. The fewer women who aspire to and attain careers in the sciences, the less likely that attitudes and views of these career areas as masculine will change. As long as these career areas are perceived as masculine, only a few young women will be encouraged to aspire to them.

In fact, suitable role models for the gifted are lacking. The purpose of a role model is to prepare a person psychologically for implementing behaviors in real-life situations. To be accepted as a role model a person must be identified as exhibiting behaviors or traits that are perceived as favorable or leading to desirable outcomes. Well-intentioned parents and counselors frequently do not provide suitable career role models for the gifted, however. In the absence of suitable role models, a certain amount of floundering takes place.

To counter the lack of suitable role models in mathematics and the sciences, educators must make concerted efforts in the area of decision making. Before selecting or not selecting an area of study, students weigh the expected results of choice. This weighing of consequences is not generally done with total awareness of facts. Instead, expectancies are often based on stereotypes, suspicions, and hearsay. If students maintain a negative evaluation of a certain course of action, they will characteristically avoid it.

EDUCATION FOR GIFTED WOMEN

The question, then, is how to break the chain. If society is truly committed to encouraging women to develop all their talents more fully, how can this be done? Removing external barriers, such as sex discrimination in hiring, will not automatically increase the ranks of women scientists.

Affirmative-action programs for women should be encouraged to become advocates of special education for gifted and talented students. Several studies indicate that programs for gifted and talented students can lead to greater achievement in mathematics for gifted young women.

Early identification and placement in academically challenging programs may be especially beneficial for female students. In a report to Congress, the Commissioner of Education (Marland, 1972) noted that grade skipping by one or two years was appropriate for gifted students. The ages at which such grade skipping can best be done, however, may be different for the two sexes. Studies of children who entered kindergarten or first grade early indicate that girls outnumber the boys (Birch, 1954; Hobson, 1963; Worcester, 1956). Gifted male adolescents are more likely candidates for acceleration than are gifted female adolescents (Fox, 1975a).

Casserly (1975) studied 12 high schools in the United States that had twice the national percentage of female students enrolled in Advanced Placement courses in mathematics and the physical sciences. These schools were characterized by one or both of the following:

1. Teachers in these schools actively recruited young women for the advanced mathematics and science courses. These teachers were conscious of the negative aspects of sex-role stereotypes and demanded high-level performance from both male and female students.

2. Many of the female students in these classes had been tracked into special programs for superior students as early as fourth grade. Thus, their taking advanced courses was a natural sequence in their school curriculum.

Designed by the Study of Mathematically Precocious Youth (SMPY) and IGCSG at the Johns Hopkins University, special accelerated classes for mathematically gifted students have been successful in promoting achievement of gifted male and female students. Female students have been extremely successful in such programs when the teachers have been women or the classes integrated into a school system program for the gifted (Fox, 1974a, 1975b, 1976c; Stanley, 1973, 1976).

In 1973, 26 mathematically gifted seventh-grade female students participated in an accelerated summer program in algebra. The class was taught by a woman and included some career counseling. Although 18 girls learned Algebra 1 to a level of apparent mastery, only 11 were allowed by their schools to take Algebra II during the following year. By the end of the 10th grade, however, 50 percent of these young women were accelerated in mathematics by at least one-half year, most of them by a full year. This degree of acceleration was compared with that of gifted male and female students who had not been in the accelerated program. (The comparison groups were matched on measures of numerical and verbal aptitude and socio-economic factors.) The gifted male students were about as accelerated as the female students in the special program. The comparison group of gifted female students was considerably less accelerated than were the comparison group of boys or the girls in the special program. Thus, early intervention of an accelerative rather than remedial nature can help lessen the achievement gap between the sexes at grade 10 (Fox, 1977).

The studies at Johns Hopkins suggest that adolescent girls are more reluctant than adolescent boys to accelerate themselves in mathematics if such acceleration sets them apart from their peers. If the accelerated mathematics learning can occur in a supportive social situation and one in which there is a sizable number of female students, the female students will participate and succeed. Casserly's study also concluded that the success of early tracking into gifted programs for female students was related to social factors. Female students formed a reinforcing support system for each other.

The studies at Johns Hopkins also suggest that career education for gifted girl students is an important component of successful programs for the gifted. In a pilot study of a career-education and mathematical-skills project for gifted fifth-and sixth-grade pupils, two male and two female mathematicians taught short courses on topics such as statistics, geometry, probability, and computer sciences. Female pupils in the program became more positive toward mathematics and more interested in careers in mathematics and computer science (Fox, 1976c).

IMPLICATIONS FOR COUNSELING

There is a clear need for counseling gifted female achievers. Three areas of specific interest to counselors are career interests and expectations, significant others, and early identification. Specific interventions are called for in each of these areas.

Isaacs (1973) indicated that the directions in which talent and superior ability exist are multiple and diverse. Fox, Pasternak, and Peiser (1976) demonstrated that girls who have well-above-average mathematical ability are attracted to both masculine and feminine career areas and thus experience conflict in career decision making. Rodenstein, Pfleger, and Colangelo (1977) suggested that career counseling for gifted women should focus on subtle suggestive aspects of career and life-style development. Counselors of gifted females would be wise to develop ongoing support groups in which young women can regularly meet and explore life roles that may be apparently conflicting, examine and clarify their values, engage in goal-setting activities, and learn conflict-resolution techniques. Assertion training may also be in order for some. Decision making that leads to effective control over an individual's life involves self-awareness and awareness of realities external to self. Career decisions specifically call for a knowledge of job tasks and job environments based on fact, not on expectancy, hearsay, stereotype, or suspicion. Counselors are called on to design work-exploration experiences that lead young women to discover facts. Counselors must also identify and provide gifted female students contact with suitable role models from a multiplicity of lifestyles so that alternatives can be clearly and realistically viewed.

Among significant others, parents of boys more than parents of girls have been shown to foster their children's scientific interests. Parents

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GIFTED FEMALES, from p. 3

of gifted children, but particularly those of gifted girls, need to learn about the unique characteristics and abilities of their children. Therefore, counselors must establish parent-counseling groups not only to discuss characteristics and abilities but also to stimulate parents to meet the developmental needs of their children. Parents must be appraised of the conflicts that their gifted girls experience regarding careers in math and science and the perceived and real demands of the same. For both students and parents, stereotypes must be exposed for what they are. There is, for instance, nothing inherently masculine about medicine or feminine about nursing, despite popular perceptions.

Counselors cannot expose stereotypes they themselves accept. The counselor who thinks that a woman should be passive and dependent rather than assertive in exploring and developing her talent, that a woman should run a household and foster a man's career rather than her own, that a woman should gain real fulfillment through nuturing others rather than through achievement, or that a woman should derive satisfaction only from activities that are social and emotional rather than cognitive can hardly be of aid to gifted young women. Counselor educators and supervisors must lead professionals to examine their own goals and values and become positive significant others to their gifted clients. This professional exploration involves awareness exercises and decision-making training.

Early identification of the gifted is also a task for counselors. Frequently, there is peer pressure against being bright. Lack of peer support leads to lack of communication, a component in social maladjustment. In the gifted, however, peer effects are often related to mental age rather than chronological age (Zaffran & Colangelo, 1977). For the intellectually gifted, early identification leading to academic acceleration may enhance rather than impede social development and mental health. For all gifted youth, counseling must occur when the students need it. This need is particularly true for gifted young women who must contend with negative social pressures.

CONCLUSIONS

A body of knowledge about gifted young women based on research must be introduced into counselor-training programs and counseling practice. The focus in school counseling needs to be broadened from emphasis on gifted female under-achievers to include gifted female achievers. These achievers must be made aware of the value of more independent control over their educational and personal lives.

Gifted young women need to learn the nature of their motivations and of their life, work, and leisure values. They also need to identify their strengths. In the counseling of gifted young women, skills identification needs positive emphasis to counter the negative pressures and influences from their peers.

Counselors and counselor trainees need to know that decisions are made continuously and that today's and tomorrow's decisions are heavily influenced by yesterday's. Gifted young women have a wider field of choices than their nongifted contemporaries; yet they tend to limit themselves as a result of social pressure or expectations. Counselors must become aware of the real and sometimes disastrous consequences of this attitude and help clients make choices from the total available field. Counseling activities, particularly for careers, should take place early in pre-adolescent years before gifted young women become socialized against the full development of their abilities.

Talented and superior female students need help to perceive the many opportunities available and to choose wisely from among them. Counselors should apprise parents of the characteristics of gifted girls and help them recognize that their daughters are different in some ways and not apt to respond in a manner typical of adolescent girls.

Research on gifted students points to specific areas of need. Today's counseling technology can meet these needs. Those counselors who are prepared must now give guidance for gifted girls a hearty try.

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[2]Dr. Fox is a Professor of Education and Dr. Richmond is an Associate Professor of Education at The Johns Hopkins University.

PSAP'S 1983 SUMMER PROGRAM

PSAP'S 1983 Summer Program for able and eager youngsters has a wide variety of options for students of differing ages. For those of you who are familiar with similar types of programs offered at universities that are also conducting Talent Searches, you might note that ours has several key differences. We have one session that spans the entire six-week program from June 18th to July 29, 1983. We have found in our experience that this length of time provides plenty of opportunity for the students to get to know one another and to develop the kinds of study habits and homework behaviors that will be to their benefit from this point onward. We also provide a counseling workshop and the opportunity for individual counseling services to aid students in developing academically and personally to the fullest extent possible.

For Talent Search participants, a series of rigorous academic classes are offered in the following subjects: precalculus mathematics; Calculus I (AP); Expository Writing; Advanced Language and Composition (AP); Mythological Themes Throughout the Humanities; Latin and Greek in Modern Day Use; Latin I; Laboratory Science; Computer Science: Microcomputers, FORTRAN, or PASCAL; Chemistry (AP); Vocabulary Development; Principles of Economics; Geology; and

Speech & Debate. Talent Search participants will also be able to take part in counseling workshops involving the following topics: study skills training; communication skills training; career exploration; and educational planning. A six-week residency program for students attending the Talent Search classes will again be offered. This program includes a variety of supervised recreational and educational activities.

For students who are not eligible for the Talent Search classes and workshops, there are two options. A set of classes is being offered for young students (roughly, ages 7 through 11 years). These classes include: Fast-Mathematics (the computational sequence through Algebra); Basics in Writing; Computer Literacy; Science Exploration; and Reading the Classics. For older students who have completed the Talent Search classes (or who are more advanced in their development of skills), college courses are offered for college credit. In this program, called the "Able and Ambitious" program, students take actual college courses and earn college credits. The schedule for this option is different from PSAP'S six-week program. A special application procedure must be followed. Students attending the second summer session (July 5 to August 5, 1983) have the option of participating in the residency program.

The deadline for summer classes registration is May 11, 1983. For more detailed information write Catherine M.G. Cohn, PSAP, Department of Special Education, Arizona State University, Tempe, Arizona 85287 or call (602) 965-4757 and request a summer brochure.

TEN WAYS OF STUDY THAT WORK

*Dr. William Christen**

Efficient ways of study are not a matter of guess work. Psychologists have been working for years on how to study. Research on the best methods of study has been conducted at top universities. Careful experiments with groups of students have thrown light on ways of study that are best. By using these ways, one should learn more easily, remember longer, and save hours of study time.

The suggestions that follow are based on the results of these experiments:

1. **MAKE AND KEEP A STUDY SCHEDULE.**
   Set aside certain hours each day for homework. Keep the same schedule faithfully from day to day. The amount of time needed for study will vary with the individual student and the courses on his schedule.
2. **STUDY IN A SUITABLE PLACE - THE SAME PLACE EACH DAY.**
   Is lack of concentration one of your study problems? Experts tell us that the right surroundings will help greatly in concentrating. Your study desk or table should be in a quiet place - as free from distractions as possible. You will concentrate better if you study in the same place every day.
3. **COLLECT ALL THE MATERIALS YOU'LL NEED BEFORE YOU BEGIN.**
   Your study desk or table should have certain standard equipment - paper, pen, ink, an eraser, a dictionary, and whatever else you may need. With all your materials at hand, you can study without interruption.
4. **DON'T WAIT FOR INSPIRATION TO STRIKE - IT PROBABLY WON'T.**
   We can learn a lesson about studying from observing an athlete. Can you imagine seeing an athlete who is training for a mile run sitting on the field waiting for inspiration to strike before he starts to practice? He trains strenuously day after day whether he wants to or not. Like the athlete, we get in training for our tests and examinations by doing the things we're expected to do over a long period of time.
5. **A WELL-KEPT NOTEBOOK CAN HELP RAISE YOUR GRADES.**
   Guidance counselors tell us that there's a definite relationship between the orderliness of a student's notebook and the grades he makes. Set aside a special section for each of the subjects on your schedule. When your teachers announce important dates for tests and examinations, you'll find how priceless orderly notes can be.
6. **MAKE A CAREFUL RECORD OF YOUR ASSIGNMENTS.**
   Why lose time phoning all over town to find someone who knows the assignment? Put it down in black and white - in detail - in a second place in your notebook. Knowing just what you are expected to do and when you are expected to do it is the first long step toward completing important assignments successfully.
7. **USE "TRADE SECRETS" FOR SUCCESSFUL STUDY.**
   Flash cards are "magic helpers." On the front of a small card you write an important term in history, biology, English, etc., and on the back, a definition or an important fact about that term. Carry your flash cards with you. At odd times take them out and ask yourself the meaning of the term. If you don't know, turn to the other side and review the answer.

   The "divided page" is another trick of the study trade. Make a dividing line down the center of a sheet of notebook paper, then write important questions on the left side and the answers on the right. Use the "self-recitation" method of study. Cover the right-hand side and try to give the answer. Then check and re-check until you're sure you know the material.

   A simple but effective study device is a "cover card." As you are studying, look at your notebook or textbook and read what you are trying to memorize. Then use your "cover card" to conceal what you have just read - and try reciting or writing the facts from memory. Check until you are sure you have mastered these facts.
8. **GOOD NOTES ARE YOUR INSURANCE AGAINST FORGETTING.**
   Learn to take notes efficiently as your teachers stress important points in class and as you study your assignments. Good notes are a "must" for just-before-test reviewing. Without notes, you will often need to reread the whole assignment before a test. With them, you can call the main points to mind in just a fraction of that time. The time you spend in taking notes is not time lost but time saved.
9. **PERHAPS YOU'VE ASKED, "HOW CAN I REMEMBER WHAT I'VE STUDIED?" ONE SECRET OF REMEMBERING IS OVER-LEARNING.**
   Psychologists tell us that the secret of learning for the future is **over**-learning. **Over**-learning is continuing your study **after** you have learned the material well enough just barely to recall it. Experts suggest that **after** you can say, "I have learned the material," you should spend in **extra** study one-fourth of the original study time. In an experimental study, students who **over**-learned the material remembered **four** times as much after 28 days had passed as those who did not.
10. **FREQUENT REVIEWS WILL PAY YOU WELL - IN KNOWLEDGE, GRADES, AND CREDITS.**
    Without review the average student can forget 80% of what he has read - in just two weeks! Your first review should come very shortly after you study material for the first time. The early review acts as a check on forgetting and helps you remember **far** longer. Frequent reviews throughout the course can pay you well in pre-test peace of mind.

Last, add will-power to follow through! Suggestions about how to study help us no further than we help ourselves. As with most everything in our lives, the slogan is "It's up to you!"

If you try earnestly to increase your study efficiency, the improved skills should become your permanent habits. The result can be a definite improvement in your performance at school and the satisfaction that comes from knowing that you have indeed put forth a maximum effort in self-preparation.

*Dr. Christen is the Director of the College Reading Program at Arizona State University and the author of *Developing Study Skills: A Practical Approach*, currently in press, to be published this year by Kendall Hunt Publishing Co.

TIPS (Tips for Intellectually Precocious Students) EARLY EDUCATIONAL ADVANTAGES DECISIVE[1]

Julian C. Stanley[2]

In her scholarly, admirably lucid *Scientific Elite: Nobel Laureates in the United States* (New York: Free Press, 1977, $14.95), sociologist-of-science Harriet Zuckerman provides specialists in the gifted invaluable insights into how some scientifically highly talented youths multiplied their educational advantages cumulatively to leap far ahead of their intellectual peers. They attended academically better institutions earlier, studied under extremely able scientists, and took their doctorates at prestigious universities quickly. E.g., the Nobel Laureate chemist T.W. Richards got his Ph.D. degree from Harvard at age 20, the Nobel Laureate chemist Robert B. Woodward from MIT at 20, and the Nobel

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Laureate physicist Julian Schwinger from Columbia at 21. They received the Ph.D. degree far earlier than the median age "of 29.5 years for the run of doctorates in science in 1957 . . . The laureates started their graduate work earlier and also took less time to complete it" (p. 89).

Dr. Zuckerman makes clear the great value of considerable educational acceleration for gaining the types of advantage extremely helpful in beginning the move toward becoming a distinguished scientist. Without systematic identification or planned educational facilitation the greatest initial advantages went chiefly to the already-advantaged. This militates against the *typical* scientifically brilliant youth's ever entering the scientific elite.

The Study of Mathematically Precocious Youth (SMPY) at The Johns Hopkins University has operated for nine years on the "cumulative multiplicative advantage" model. Its main way to confer advantage initially is to identify through a systematic annual Talent Search in Maryland and adjoining states students (mostly seventh-graders) who reason extremely well mathematically so that their potentialities can be called forcefully to the attention of the youths themselves, their parents, and their local educators. Detailed suggestions, constituting a "smorgasbord of educationally accelerative special opportunities," are made so that further advantage-boosting actions can be taken quickly by those who are *eager* to move ahead educationally fast and well. SMPY studies the ablest members of the group further and itself provides some special programs, such as fast-math classes and tutorial "mentors."

As SMPY's publications thus far, especially four books, and articles in the public press show, those mathematically precocious youths who seize special opportunities do indeed forge ahead of their equally able agemates educationally with the speed of a Japanese express train. Advantages do multiply, rather than merely increase additively, the pace of the well-motivated youth toward his or her professional goals. Although the staff of SMPY does not expect to produce Nobel Laureates from a rather small population of highly talented youths (about a thousand) in a single region over a short period of time, it is becoming increasingly evident that those using the special opportunities are on their way to considerably more scientific achievements and, probably, distinction, than would otherwise have occurred. Over the years it will be interesting to watch as many of them do become highly competent or even outstanding scientists.

We are grateful to Dr. Zuckerman for showing in detail how the "advantage" model works effectively to produce the scientific elite. SMPY's application of the model seems more democratic than that leading to Nobel Laureates and members of the National Academy of Sciences, but the basic ideas are the same. Don't fail to read *Scientific Elite* thoughtfully and ponder its implications for your situation!

[1]This article was reprinted from the ITYB (Intellectually Talented Youth Bulletin), Vol. 4, No. 10 (Summer, 1978), p. 11.
[2]Dr. Julian C. Stanley is a Professor in the Department of Psychology and Director of the Study of Mathematically Precocious Youth (SMPY) at The Johns Hopkins University.

IN MEMORIAM: DR. LEONARD CAHEN

It is with great sadness that we at PSAP announce the death of our colleague and good friend, Dr. Leonard Cahen, on March 18, 1983. Dr. Cahen received his doctoral degree from Stanford University and conducted several research enterprises, among them direction of Stanford's National Longitudinal Study of Mathematical Abilities and the founding of the Working Group on Evaluation in the late 1960's. He came to Arizona State University four years ago, combining his knowledge of research strategies with a real desire to share that knowledge with possible future researchers in the field of education.

While Dr. Cahen's contributions to the field of education were innumerable, his expertise in many other areas was tremendous. Dr. Cahen was an avid bluegrass musician, playing often with local groups, a gourmet cook, an expert gardener and photographer. But perhaps the most striking characteristic of Dr. Cahen was his interest in people and in ideas. His concern for students extended to spending hours in discussion of their research, searching actively for additional information for them, and extending his knowledge to encompass their areas of interest. His interest in the gifted child allowed those of us at PSAP to use him as a sounding board, a devil's advocate, an adviser and a friend. His death will be keenly felt, not only by PSAP and Arizona State University, but by the entire field of educational research.

PLANNING TO GO TO COLLEGE?*

It's not too soon to start.

College may seem a long way off, too soon even to plan for it. But time has a way of slipping by quickly, and some of you may get to college much earlier than you expected. It's likely that many of you may take at least one college course before you finish high school. Not only are some colleges taking students at the end of the 10th or 11th grade, but some allow students to take courses while attending high school. So you see, maybe it's time to think "college" after all.

We'd like to suggest some ways of preparing yourself for this new experience!

1. *Learn To Type.* Typing is a great aid to college students - particularly if their handwriting is not easy to read. Professors are much happier when you hand in a neatly typed report rather than a difficult-to-read handwritten paper. In fact, many times professors will accept only typewritten reports. If your school offers a course in typing, perhaps you should consider taking it next year or next summer.

2. *Learn To Take Notes.* Learning to take clearly written, well organized notes is important. Professors often cover a great deal of material in class. It's often useful to take notes in outline form, stressing key words and examples. You might wish to learn speedwriting or some form of shorthand. Also, it is helpful to read over your notes soon after the class, while the lecture is fresh in your memory, to be sure they are readable and complete.

3. *Work Ahead.* When you begin a new course it is often helpful to get ahead of the assignments and reading, if possible. Review your class notes frequently and perhaps underline special points and passages in your textbooks for quick reference. If you stay ahead, you will find that preparing for exams will be easier. It will help free you from some of the pressure at the end of the course.

4. *Set Your Goals High.* When you begin a course, aim for the best grade in the class - A+. Even though you may not make the A+, you will probably learn more and get a good grade by working towards the high A.

5. *Develop Good Study Habits.* Start now to approach studying the same way you will someday need to approach a job. Having a regular place, a regular time, and all the necessary materials such as dictionaries, good lighting, paper, and pencils is helpful to the serious student. Many books have been written about good study habits. Your local public library will probably have several how-to-study books to choose from.

*Reprinted from the *Newsletter of the SM&SPY*, Vol. 1, No. 7 (July 14, 1972). This newsletter was the predecessor of the *ITYB* which was published at Johns Hopkins University by the Study of Mathematically Precocious Youth (SMPY).

TAPS (Tips for Artistically Precocious Students)

PIANO COMPETITION WINNERS ANNOUNCED

The First Annual National Piano Conference and High School Competition, held March 11-13 at Arizona State University*, was a "great success" according to its coordinator, Robert Hamilton of the ASU Music Faculty. The competition drew entries from many parts of this country and Canada. First place and a $1,000 prize were won by Keith Albright, a fifteen-year-old from Beaumont, Texas, who played Bach's Prelude and Fugue No. 15, Chopin's Scherzo No 1 in B Minor, Opus 20, and Nocturne in F-Sharp Major, Opus 15, No. 2, and Beethoven's Sonata in C Major, Opus 2, No. 3. Still a sophomore in high school, Keith has performed with the Texas Little Symphony, the Baylor University Symphony and the Beaumont Symphony. Second place and a $750 award were won by Margaret Ahn, who is in the preparatory division of the Juilliard School. Third Prize winner and recipient of

$500 was Lori-Ann Matsuo, 17, of Waipahu, Hawaii. John Robertson, 17, of Calgary, Alberta, Canada, and Frances Martin, 16, of Salinas, California, were the fourth and fifth place winners. Each received $200. Twelve semi-finalists participated in the competition. Those who did not place in the finalist category to vie for the top prizes were awarded $100 each.

*Announced in the *Chronicle of Academic and Artistic Precocity*, Vol. 1, Number 4, p. 3.

Flannery O'Connor
A Biographical Analysis

*William F. Stanton**

Flannery O'Connor was described in the New Republic as ". . .the Georgia hick, the witty writer, the Catholic, the southern lady . . . the woman of discipline whose many selves added up to genius" (Hendrin, p. 35). Seldom in the world of literature has someone whose career was so short and who produced relatively few literary works been the recipient of such numerous and complimentary critiques and studies.

The body of work left by Flannery O'Connor, though small, has been critically well-received as evidenced by the numerous honors bestowed upon her and her work. She was the recipient of the O. Henry Memorial Awards in 1954, 1955, 1956, 1957, 1958, 1963 and 1965. Miss O'Connor was awarded the Bellaman Foundation Special Award, the National Book Award, and the National Book Critics Circle Book Award. In addition to these honors, she was given a Kenyon Review Fellowship, a National Institute of the Arts and Letters grant, and a Ford Foundation grant (Evory, 1981).

Flannery O'Connor's literary work was divided between novels and short stories. The novels include *Wise Blood* (1952) and *The Violent Bear it Away* (1960). It was for her collections of short stories that she was most widely known. They were published in two volumes, *A Good Man is Hard to Find* (1955) and *Everything That Rises Must Converge* (1965). Two other books were published posthumously. One is a book of personal correspondence, *The Habit of Being* (1979). The other is a collection of lectures and essays, *Mystery and Manners: Occasional Prose* (1969).

Mary Flannery O'Connor was born on March 25, 1925, in Savannah, Georgia. She was the only child of Edward O'Connor, a real estate broker, and Regina Cline O'Connor. The O'Connors were both from prominent Georgia families and were very well-known politically and socially in central Georgia (Getz, 1980). The home in which Flannery was raised is on the city square in Savannah, across from the historical Cathedral of Saint John the Baptist.

During her youth, Flannery asserted herself as a unique person. According to Getz (1980, p. 8), she had a "disconcerting imagination and a capacity for doing the unexpected." Flannery was "precocious and independent. She seems to have enjoyed the company of her parents more than that of other children" (Sicherman et al. 1980, p. 513). It was as a young child that Flannery began to write. She kept several journals, composed poems, and wrote stories and essays. She delighted her father by placing these original writings under his napkin at the table. Flannery's father was a great influence in her life because he desired to write himself and encouraged his daughter to write (Getz, 1980).

When Flannery was thirteen, her father was striken with an incurable disease, disseminated lupus. The family business was sold and the O'Connors moved to Milledgeville, Georgia, Mrs. O'Connor's home town. There they lived in a rambling old house that had served previously as the governor's mansion. Flannery enrolled at the Peabody Public High School where she devoted her time to writing poetry and prose, drawing cartoons, and paintings. She even wrote a series of short books. It was at this point that tragedy struck again: her beloved father died in 1941 (Getz, 1980).

Flannery decided to attend Georgia State College for Women (now Georgia College). She received very little help from her instructors in the English department. Nevertheless, Flannery pursued her interest in writing by serving as the art editor for the student newspaper, *The Colonnade*, editor of *The Corinthian*, a literary quarterly, and feature editor of the yearbook. Because of her unhappiness with the English department, Flannery decided to change majors and graduated with a Bachelor's degree in Social Science in only three years. More importantly, she finally received recognition for her writing talent and was awarded the Rinehart Fellowship to attend the Writers' Workshop at the State University of Iowa (Getz, 1980).

Flannery, who now had her first name, Mary, legally dropped, received encouragement and advice from Paul Engle, the director of the Writers' Workshop. She was also exposed to many prominent writers and gladly accepted their criticism and advice. She became acquainted with Robert Giroux, who was to help her with publication problems and also became a close personal friend. Flannery's first publication appeared in Accent Magazine while she was still in the school. It was a short story entitled "The Geranium" and was part of her work for her Master's thesis. In 1947, she won the Rinehart-Iowa Fiction Award for her first novel, *Wise Blood*, which was still unpublished. Subsequently, she was recommended for and accepted a place at Yaddo, a philanthrophic foundation which offered artists a place to stay and concentrate on their craft. In 1949, Flannery left Yaddo and eventually moved into the home of her lifelong friends, Robert and Sally Fitzgerald (Fitzgerald, 1979).

It is tragic and ironic that just as her writing career was beginning to soar, Flannery O'Connor became ill in 1950 and nearly died. The diagnosis was grim - disseminated lupus, the same disease that had killed her father. Flannery was determined not to let the disease prevent her from doing what she had set out to do as a child. She and her mother moved to Anadalusia, Georgia and lived on a small farm. Throughout those early trying months Mrs. O'Connor was a source of help and encouragement to her daughter. Mrs. O'Connor had always given guidance and inspiration to her daughter and, as explained by Fitzgerald (1979, p. xii), while Flannery had been away from Georgia she and Mrs. O'Connor wrote each other every day.

Although Flannery survived another fourteen years after the onset of the lupus, they were painful and difficult years. Eventually the steroid drugs, used to control the lupus, began to erode her bones and Flannery had to resort to using crutches. It is at this point that the true spirit of this remarkable woman becomes evident. Flannery refused to give in to the disease. She continued to receive visitors, especially young writers whom she helped with their work. She took her first plane ride to give a series of lectures. Driskell and Brittain (1971) note that, at the urging of her cousin Katie, she and Mrs. O'Connor went to Lourdes, France, and also had an audience with Pope Pius XII.

Flannery O'Connor continued to produce stories, novels, and literary criticisms throughout her life. Some critics have commented on the meager amount of work she produced, but when one considers the pain and troubles she experienced the work Flannery completed becomes monumental in proportion. She wrote up until the day of her death, August 3, 1964, at the age of 39. Her collection of short stories, *Every Thing That Rises Must Converge*, is considered by many to be her best work. It was published soon after her death.

Flannery O'Connor has continued to be a major force on the American literary scene. Her life and work have been the subject of over a dozen books, numerous articles, and a play. Her work has been translated into several foreign languages and she is the subject of an annual literary publication, *The Flannery O'Connor Bulletin*.

Flannery O'Connor's writing deals with the tragic and the grotesque, reflecting the tragedies of her life, but her writings and her life also evoke a sense of humor. Her profound commitment to Catholicism, in the predominantly Protestant South, is a sign of her strong personality. What pervades any study of Flannery O'Connor is her personal strength, her persistence, her drive for excellence, and her indomintable spirit.

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CHRONICLE OF ACADEMIC AND ARTISTIC PRECOCITY

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MATHEMATICALLY ABLE GIRLS: A SPECIAL CHALLENGE[1]

Lynn Fox, Ph.D.[2]

Susan and Ted were identified as mathematically talented when they were in the seventh grade. Ted began to accelerate his educational progress and completed a four-year high school program in three years. At age seventeen he entered a university with sophomore standing. He had acquired a year's college credits by taking the Advanced Placement Program's examinations in several subjects and college courses on a part-time basis while in high school. He is planning a career in electrical engineering. Susan, on the other hand, did not accelerate her progress in school and did not elect a physics or calculus course in her junior or senior years of high school. Her career plans are vague and she is not excited about going to college.

Mary was also identified as very mathematically able when she was in the seventh grade. Although she was in an Algebra II class as an eighth grader, her mother overheard her tell a friend that she was taking general mathematics because she was "too dumb" to be in an Algebra I class. The following year she chose to not take a mathematics course instead of going to a high school one period a day for a plane geometry course. Mary apparently feared rejection by her peers if she did something atypical.

Recent research on highly able mathematical reasoners in grade seven provides insight into the needs of highly able girls. Over the past eight years almost 20,000 students, primarily seventh graders, have participated in talent searches at the Johns Hopkins University (Stanley, Keating, & Fox 1974; Keating 1976; Stanley, George, & Solano 1977). Even though the mean score for boys in the talent search has been about 35 points higher than the mean for girls, all boys do not score higher than all girls. Many girls are extremely gifted, as evidenced by the fact that each year about a fourth of the girls in the talent search have scored higher than the average of college-bound senior girls on the mathematics portion of the Scholastic Aptitude Test (SAT).

Thus, although it is true that more boys than girls exhibit extreme mathematical ability in adolescence, enough girls show real ability so that the gap between the sexes in achievement and career attainment in mathematics and science cannot be explained solely in terms of differences in aptitude. Many girls who are quite talented in mathematics, like Susan and Mary, simply do not develop their skills to the fullest. Some girls fall victim to societal stereotypes about intellectual giftedness and mathematics being more appropriate for men than for women.

The boys and girls who have participated in the talent searches have tended to differ in several ways with respect to attitudes and interests. The girls generally have less self-confidence than the boys. The girls are less interested than the boys in trying to accelerate their learning of mathematics. And, although the vast majority of the boys have interests in mathematical and scientific careers, many of the girls appear to have conflicting career interests. Sometimes girls lean toward an intellectual career and yet are also pulled toward careers of an artistic or social-service nature. Some girls have concerns about how to combine a career with the role of wife and mother. Boys do not perceive comparable conflicts in their career interests.

Women who have developed their abilities in mathematics and science often recall the support and encouragement of a teacher or a

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COMPUTERS AND THE NEW EDUCATION

James P. Boyle•

For the past one hundred years or so, education has essentially followed the same basic model — a teacher with a number of students in a class and courses for the group dictated by the curriculum. In spite of all the studies and the millions of dollars spent on research, very little has changed. The one-room school house was probably the best educational model to date. This was abandoned by the pressures of sheer numbers of learners. The very best education is a teacher and a student interacting in a tutorial situation. Obviously, the educational monies cannot support this — only the parent can when a child gets behind in school. What the tutorial model does reveal is that each child learns in his or her own way at their own rate.

The critics of the educational system are becoming more vocal — dropping test scores, lack of basic skills, and soaring costs. There clearly needs to be a radical change in the near future to meet the needs of students and society. This change can be accomplished in a large measure by the effective utilization of the microcomputer and its almost unlimited potential to remember, to calculate, to sequence, to classify, and perhaps most important — to teach! Yes — to teach!

The first loud objection to this last function is that it is inhuman to put a child in front of a machine and expect learning to occur. Only a teacher delivering information to students working with textbooks, workbooks, etc. can perform the teaching task. Unfortunately, the school curriculum, as now defined by grade levels and courses, does make this rationale true. Obviously, with the computer it will be necessary to re-think the traditional curriculum, re-define our learning goals and re-structure the educational process. Educators have been trying to do this for many years, but the tremendous growth and interest in computers is literally forcing educational change.

If the schools are to survive, they are going to have to employ the new technology. Studies indicate that the average factory worker in the U.S. is supported by over $25,000 worth of technology. The teacher in the public schools has almost no technological support. The dramatic decrease in computer-costs, to date and in the future, may well result in every child, in every school, having access to a computer.

The tremendous growth of computing power and the dramatic decrease in its cost has been well-documented. Educators everywhere are being forced to adapt to new thinking as to how best to implement and utilize this powerful tool. Unfortunately, education is lagging behind business and industry by about 30 years in computer expertise. Recent years have produced educational conferences, workshops, and in-service programs on the microcomputer. Education is trying hard to play "catch-up" with the technology. As a result a considerable degree of trial and error is occurring and mistakes are being made and are being replicated.

The challenge to the school administrators will be to minimize misuse of computers and to develop a sound educational philosophy for immediate and future implementation. Recent studies show that for every computer in a school, only $98 has been expended for software.

These figures indicate that the record of schools utilizing computers to assist teaching and learning is very bleak. Educators are still attempting to use the computer in the "old curriculum" by creating another "course". This is most commonly known as something called "computer-literacy". However, no one can really define computer-

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parent (Luchins & Luchins 1980; Helson 1980). Young women who elect difficult courses in physics and calculus sometimes recall that they were identified for an academic track or a gifted program while still in elementary school. This helped them to form a peer network that reinforced their interests in taking advanced courses in mathematics and science (Casserly, 1980). Unfortunately, many gifted girls are not recognized as being very talented by their parents or teachers, and fewer than one in five have access to special programs in their schools.

In the early years of the talent searches, it was clear that parents of girls were more likely than parents of boys to be surprised to learn of their child's ability. Nor were the parents of girls as eager as most of the parents of boys to have their children accelerate their study of mathematics, especially if it involved taking college courses early. In the last two talent searches, parents of girls seemed to be less concerned about stereotypes of a "mathematical whiz" than were parents in the past.

ENCOURAGING MATHEMATICALLY ABLE GIRLS

No matter how much support girls may receive at home they still need encouragement from their teachers. Even if special programs for the highly able are not available in a school, there are many ways in which teachers can intervene and create a more supportive school environment for these girls. The following paragraphs detail specific suggestions for helping mathematically able girls.

IDENTIFY GIFTED GIRLS EARLY

If girls are to be encouraged to develop their interest and competency in mathematics, it may be very important to identify girls who have great potential at an early age. High scores on standardized tests are the most reliable indicators of talent (Keating, 1980). Some teachers may be surprised to find that a girl considered a behavior problem or a student with a poor attitude is actually very talented. Indeed, some teachers dislike girls who are analytical, unconventional, and independent because the teachers view these traits as unfeminine and inappropriate (Welsh, 1977). One mother of a very precocious third-grader was told by her daughter's teacher that there might be something wrong with the girl because she preferred the company of boys to girls at her school. Highly able girls are often described as "tomboys" in the early childhood years because they like the toys and games that are often considered masculine. Such "deviant" interest may actually be an indication of a budding interest in science.

COUNSEL PARENTS

Once a girl has been identified as mathematically able it is important to make her parents aware of this fact. They may not have thought to encourage her to become a scientist or an engineer, to have bought her a microscope, or to have enrolled her in a summer science enrichment program.

ENCOURAGE GIRLS DIRECTLY

Telling girls that they are very good at mathematics and helping them to view this as appropriate for girls as well as boys may have both long- and short-term effects on their self-confidence and their career and educational aspirations. Encouraging girls to study mathematics on their own and introducing them to the world of recreational mathematics materials in the library may be beneficial. It is also important to urge these girls to take the most advanced mathematics and sciences courses in high school.

INDIVIDUALIZE INSTRUCTION

At present, some form of acceleration is the most direct and least expensive way to provide more difficult content at higher levels of abstraction for highly able students. Although these methods work well for some students, they are unattractive to many girls (Fox 1977). The use of more diagnostic testing and prescriptive instruction and a wide variety of alternatives is necessary to allow gifted children to proceed at whatever pace their abilities dictate, with and without grade-skipping. Stanley (1980) has developed an excellent model for small-group tutoring in mathematics for highly able students.

REDUCE SEXISM IN THE CLASSROOM

Textbooks and other materials available in the classroom should be examined for evidence of sex-role stereotyping, and teachers' expectations for girls should be the same as for boys. If at first they don't succeed, girls should be encouraged to try again; they should not be helped sooner than the boys. Girls should not be expected to be neater, less noisy, and more polite than boys. As a check on themselves, teachers might be encouraged to tape record an hour of their classtime to see if they interact more or differently with boys than with girls.

PROVIDE CAREER EDUCATION AND ROLE MODELS

Creative and productive behavior of both males and females in school and in life may increase as unrealistic sex-role stereotyping of careers gives way. Career awareness programs for students could be a form of relevant enrichment that opens new vistas for girls and breaks down sex-role stereotypes. Highly able boys and girls both need moral and intellectual role models who exhibit the heights that talented people can achieve. For girls, the exposure to women who use the full range of their talents and gifts may be crucial. The exposure of boys to such female role models may make them more supportive of the girls in their class. A model for career awareness programs for mathematically able girls is described in *Women and the Mathematical Mystique* (Fox, Brody, & Tobin, 1980).

The challenge for educators lies in finding mathematically able girls and helping them discover their potential and maximize their development. To do this, negative and inaccurate stereotypes of giftedness and gender-appropriate behavior must be replaced by informed understanding of the many facets of intellectual talent and recognition of the value of mathematical and scientific competence for both women and men.

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[1]Reprinted with permission from *Arithmetic Teacher*, Vol. 28, No. 6, pp. 22-23.

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literacy. The State Department of Education in Arizona is requiring computer-literacy for every college graduate in Education, but they have failed to define the term. Computer-literacy is not a valid use or justification for computers in the school. How about Television-literacy, or printing-press literacy, or automobile-literacy?

The challenge facing the schools is to change the "old curriculum" and utilize computing-power to create a curriculum for the future. This can be accomplished and in a cost-effective manner with dramatic results.

Making a sound administrative decision about the selection of microcomputers needs to be taken in a very precise and logical order. Too many teachers and administrators, in their haste to join the computer race have acquiesced to the smooth talking hardware salesman. Business and industry has faced this same problem and found themselves with thousands of dollars of hardware only to find suitable

programming to be extremely costly additions to insure the hardware will produce what the new owner needs.

In education, schools have been led down the path of main-frame, mini-frame and terminals. Microcomputers have been sold on the basis of the largest quantity for the least amount of dollars. Cost effective? Not in the long term!

What happens to the microcomputer in the corner with no software and no one to program its unlimited capabilities? School administrators must acquire computer knowledge and assume a role in the selection of both hardware and software. The process, to be effective, should occur in this order:

1. PHILOSOPHY - How is the computer and computer assisted instruction (CAI) going to interface with your school's objectives and philosophical base, remembering that this is only a tool and we need to have a basic rationale for its use?
2. PEOPLE - Who is going to use this technology? Do we have trained people? Do we have interested people? Will we have a training program? Are people afraid of the computer?
3. SOFTWARE - What programs will fit our philosophy and the needs and interests of the staff; drill and practice, tutorial, classroom management, literacy, etc.? An extensive software review is critical.
4. HARDWARE - Finally, the actual machine should be selected, not on the basis of low-bid, but rather one that will most clearly meet the adoption criteria listed above. For example, if the administration and staff really does research and development for phases 1, 2, and 3, and the Business Manager buys a machine which cannot satisfy these criteria, the school has bought a tool that will not be utilized effectively.

Clearly the administrator will face many and varied decisions as the computer-wave escalates.

Locally, Ombudsman Educational Services and the Learning Communities offer concrete examples of how educational technology can be effectively employed. For the past eight years, Ombudsman Educational Services has provided alternative educational programs, tutoring and ACT/SAT test preparation, to schools in Lake and DuPage Counties, Illinois. These programs serve students who have not been successful in the regular schools as well as those wanting to improve grades and test scores.

In the Learning Communities, all students are diagnosed for reading, math, grammar and spelling skills. Each student has an individual program based on his learning needs. Enter the computer. The students work on educational material delivered by the microcomputer. They learn at their own rate, they are told immediately whether they are right or wrong, they are tested by the computer and their scores are recorded for the teacher. The advantage of the computer is that now the teacher has time to diagnose, prescribe, motivate, and evaluate each student. The computer is actually assuming the role of a tutor.

Is this cost-effective? The Learning Communities operate at a cost per student of less than one-half of the average student cost in a traditional school. But, most important, by utilizing technology human resources can be re-allocated to a "new curriculum" in ways that were never before possible.

Ombudsman also operates The Computer Academy for those individuals who want to learn more about the microcomputer. Classes are offered in basic programming and software applications. Software and computer time is also available at $5.00/hour for individuals who do not own a computer but want to utilize the available software library, including educational programs for students as well as business and personal programs. Inservice workshops are also provided for schools and businesses who are in the process of selecting hardware and software. Ombudsman recently completed a program for the Harris Bank in Chicago to improve the basic skills of their employees.

More information on all of the computer programs available from Ombudsman and The Computer Academy are available by contacting James P. Boyle, (312) 367-6383, 1585 N. Milwaukee Avenue, Suite 9, Libertyville, Illinois 60048.

*James P. Boyle is President of Ombudsman Educational Services, Ltd.

DID YOU KNOW?

Did you know . . .

that since the Project for the Study of Academic Precocity (PSAP) was founded in 1979:

*nearly 17,500 young people have been made aware of their special talents through PSAP's Talent Searches;

*nearly 600 adolescents from 15 states have enrolled in a variety of classes on the Arizona State University campus;

*programs modeled after PSAP have been stimulated at the University of California at Berkeley, the University of California at Irvine, California State University at Sacramento, and the University of Washington at Seattle;

*PSAP's regional Talent Search has been extended from a small region in Arizona to include all of Arizona, California, Oregon, Washington, Alaska, Hawaii, British Columbia, Alberta, Saskatchewan, Manitoba, and Ontario;

*PSAP's Evaluation Clinic has offered assessment and educational counseling services to hundreds of youngsters from preschool to college age;

*PSAP's first two Annual Training Conferences have attracted more than 300 educational decision-makers to Arizona State University where they have learned how to apply PSAP models to programs for the education of the gifted in their schools;

*and nearly 50 school districts around the country have begun to or have already been implementing PSAP techniques for providing appropriate educational services for intellectually gifted young people?

HELPING THE GIFTED PRESCHOOLER[1]

Jadis Ullman[2]

"My child is only four and is already learning to read. I'm not teaching him, but he is learning anyway. Will this hurt him in school?"

"My three-year-old has learned to identify just about all the dinosaurs there are, and I'm running out of books to read to her. Will her preschool be able to help?"

The very real concerns of parents of young bright children are often shrugged off by preschool administrators and teachers. Yet, the parents' concerns may be well justified. The child who reads at four may have a hard time adjusting to a first grade reading curriculum at six, and the three-year-old with a thirst for information may stagnate in her neighborhood preschool. We could admonish the four-year-old to stop reading, and explain to the three-year-old that learning isn't everything, but such actions would not be in their best interests. There are alternatives that would be far more productive.

Perhaps the first step in helping an able young child involves acceptance of that child's precocity. The child who is outperforming his agemates in a particular subject area needs as much special attention in that area as does the average or below-average child. If this need is stifled at the preschool level we have done the child a great disservice.

A prime factor in dealing successfully with a bright preschooler is flexibility. The teacher of an able three-year-old should not hesitate to present him or her with "four-year-old work" if the child has mastered the material generally ascribed to three-year-olds. If the child quickly masters the work at the four-year-old level, he or she should continue to be challenged and given work suitable for a kindergarten student. The flexibility of the teacher in allowing the child to continue at his or her own pace will have a profound influence on the child's own motivation to continue to learn in grade school.

The pace at which these subjects should be presented depends entirely on the ability and motivation of the child. Although it is always important that the child demonstrate a desire to learn, nowhere in the ladder of education is it more important than at the preschool rung. If a three-year-old is unduly pushed to learn a more advanced subject "because he is bright," he will quickly learn to mask that brightness. He will also resent being different from other students. The child's level of eagerness to learn new material should act as a gauge for the teacher as he or she introduces new material. The child's level of self-discipline and emotional maturity should also be considered when making learning demands on him. The teacher who attempts to move a child forward solely on the basis of his ability may be confronted with a reluctant learner.

SOME SOLUTIONS.

One solution to the problem of the highly able but impatient youngster is to give him the same work as that typically required of older children, but less of it. It is likely that this child will need less repetition than the average youngster, and will probably master the material even if given less practice. Of course, mastery of the work should still be required before moving on to a more advanced task.

The three R's can be presented to an able child at a very young age. While small muscle control may not be well developed enough for a child to use pencil and paper, the manipulation of concrete materials to demonstrate more advanced concepts can start as early as age two or three. For example, the bright three-year-old is able to use cardboard

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letters to write a word, or a set of beads to perform a division problem. The use of these materials is doubly important because of the young child's dependence on concrete observation of the real world. He may be told that two plus three is equal to five, but will remain unconvinced until he can see it for himself several times. Once he has understood this concept on a concrete level, the teacher may present him with the task of reading or writing the equation itself.

Whenever possible, it is important for the teacher to allow the child to "figure it out for himself." The four-year-old who notes that the quantity 15 is really just one ten and five one's is far better off conceptually than the second-grader who is told we put the one in the number 15 in the ten's column, etc.

THE PARENT'S ROLE

The teacher of a bright preschooler has another important task; that of making the parents aware of the child's precocity and the additional responsibility it carries for them. Parents should be encouraged to explore educational alternatives and options with the teacher, among them perhaps early entrance into kindergarten or the first grade. When the child reaches grade school, parents need to be alert to the amount of real learning he or she is doing in school. The child who is not working enough in first grade, or in third or ninth grades, is unlikely to develop the kind of study habits or self-discipline needed to become an able and productive adult.

If the child has a particular strength in one area, the parents need to find ways of providing him with additional opportunities for learning in related curricula, for example, by finding the child a mentor or enrolling him in an enrichment class outside of the public or private school system. Equally important is making sure the bright child has sufficiently advanced subject matter in academically strong areas, while providing suitably difficult work in subject areas of more age-typical ability.

A cooperative effort is needed to provide appropriate educational planning for an academically advanced preschooler: It hinges upon the eagerness of the child, the dedication of the parents to their child's receiving an education commensurate with his abilities, and, of course, the enthusiasm, interest, and flexibility of the teacher.

[1]Reprinted with permission of the publisher, Allen Raymond, Inc., Darien, CN 06820, from the April 1982 issue of *Early Years Magazine*.

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TAPS (Tips for Artistically Precocious Students) Festival Features Student Work

Phoenix Arts Coming Together (PACT), Inc., a nonprofit cultural educational corporation supported and sponsored by the city of Phoenix, Arizona, will present the seventh annual Celebrate Youth Festival for young people of all ages November 19th and 20th, 1983, at the Phoenix Civic Plaza.

The purpose of the Celebrate Youth Festival is to emphasize the positive accomplishments of young people throughout the Phoenix area. The festival features all forms of art; performances by amateur groups and professional artists, special and educational displays, math and science projects, photography, music and dance, choral, gymnastics, and arts and crafts. Hands-on workshops for all ages will also be offered.

The Celebrate Youth Festival provides an excellent showcase for the work of talented young people in Phoenix area schools, churches, and youth organizations. Teachers of the gifted, along with other teachers and youth group leaders, are invited to participate. Last year more than 70,000 people attended the Festival, viewing the work of many talented young people.

Teachers and youth group leaders who wish to arrange for their class or youth group to participate are encouraged to contact the PACT office at (602) 252-5513 or write P.A.C.T., 1001 North Central Avenue, Suite 711, Phoenix, Arizona 85004.

THE INTERNATIONAL BACCALAUREATE PROGRAM[1]

Mary McNelis[2]

Readers of the *Chronicle*, aware of the vital importance of challenging academically talented students, will welcome news of a program that is earning worldwide recognition. In fact, its unique attribute is its universality. Called the International Baccalaureate, it was conceived by a group of teachers at the International School of Geneva in the early 1960's. Their plan was to offer 13th-grade students one standard university entrance examination that could be taken in and accepted in all countries in place of the several national tests (the Swiss Matunte, the American SAT, the English GCE "A" Levels, and the French Baccalaureat) for which the school was required to prepare its multinational, mobile population. In 1965 an International Baccalaureate Office was established in Geneva as a Foundation under Swiss law, and the program was offered to the first twenty schools in 1970. Three years ago, an office was opened in New York City to administer the "International Baccalaureate North America (IB)." Chartered as a nonprofit corporation by the State of New York, its purpose is to help introduce and support the IB Program in schools in the United States and Canada.

Participating high schools offer their students the opportunity for a rigorous two-year core curriculum representing a full range of academic subjects. Because in the United States the second year of the program is the equivalent of the freshman year in college, students sucessfully completing the program and passing the examination for the Diploma are qualified for sophomore standing on many U.S. campuses. As the IB becomes better known, it is anticipated that almost all colleges and universities will grant advanced standing and/or one year of college credit. IB Diploma holders are qualified also for admission to universities in 35 foreign countries.

The examination for which the students prepare is taken at the end of the two-year sequence and measures their achievement in six subjects. Three subjects, chosen by students, must be taken at Higher Level and three at Subsidiary Level. A Higher Level subject requires a minimum of 196 teaching periods, or three periods a week over two years. The general scheme for the six subjects is as follows: a) Language A (native); b) Language B (second); c) Study of Man (social studies); d) an experimental science; e) mathematics; f) optional (art, music, additional language, science, social studies, or mathematics. In addition, two common courses are required: The Theory of Knowledge (dealing with the question of truth), and Creative and Aesthetic Experience (drawing, painting, sculpture, music, drama, dance, filmmaking, or social service).

There are many U.S. high schools in the program and the list is growing. Applications must be filed, and accepted, before schools are considered to be "participating" in the program. One of the requirements for participation is that the schools must offer a complete range of subjects, even though some students may prefer to take only one or two and earn a Certificate rather than the full Diploma. (With the Certificate they may qualify for advanced placement in the appropriate subjects when they reach college.) No school, however, is expected to offer all of the possible IB courses, for there are 55 of them.

It is not as difficult as it may seem to initiate and maintain an IB program, particularly for those schools that have been offering Advanced Placement Program (APP) courses. Their commitment to college-level work for able high school students has been proven, they have learned to identify potentially successful students *and* teachers, and the expansion from one or two APP courses to the IB core curriculum is not such a giant step. But because it takes time and organization, schools need not present candidates for the Diploma during their first year or two in the program, and so are able to lay a firm base to ensure success. Stronger schools may elect to start with Diploma candidates immediately.

There is lots of help available for interested schools. Those educators presently involved in IB work are so committed to the concept and so enthusiastic about their results that they welcome inquiries and visits. Lists of IB schools and colleges, as well as more detailed information about the program, can be obtained by writing to Mr. H. Gilbert Nicol, Executive Director, International Baccalaureate North America, 888 Seventh Avenue, New York, N.Y. 10019.

[1]Reprinted from the *ITYB (Intellectually Talented Youth Bulletin)*, Vol. 5, No. 3, p. 3.

[2]Mary McNelis is Assistant to the President of International Baccalaureate for North America.

TIPS
(Tips for Intellectually Precocious Students)

Academic Preparation for College

Academic Preparation for College, a pamphlet prepared by The College Board, outlines what college entrants need to know and be able to do prior to attending the college or university of their choice. It presents, in outline, the basic academic competencies every college-bound student should attained.

The booklet, intended for students and their parents; for teachers counselors, and educational administrators; for school boards and other governmental officials concerned with educational policy and finances; and for college and university faculties and administrators, should be of special interest to highly able youths like those participating in PSAP's Talent Search. *Academic Preparation for College* will enable such students, many of whom are accelerated educationally, to compare their present state of academic readiness with that suggested for entering freshman and to make adjustments in their academic schedules to accomodate any deficiencies they or their educational counselors perceive.

Academic Preparation for College is available without charge by writing Office of Academic Affairs, The College Board, 888 Seventh Avenue, New York, New York 10106, or by calling (212) 582-6210.

SCIENCE AND THE GIFTED YOUNG CHILD[1]

Craig Blurton[2] and Frederick Staley, Ph.D.[3]

If we view gifted young children as a national resource, from which we will very likely draw our future scientists, inventors, discoverers and explorers, we need to make sure that we have prepared them adequately to fill these roles. Too often, the first formal science experences gifted youngsters have occur after they have reached the intermediate grades or junior high school. There are several reasons for this delay, including inadequate preparation in the sciences for teachers of young children; the insecurity of many female teachers in an area traditionally viewed as a "man's" field; and the heavy concentration during preschool and elementary years on teaching reading, writing, and math skills.

How does the teacher of very young children, who does not have scientific training, cope with the job of developing the potential of gifted students in this particular discipline? Actually, with preschoolers and early elementary age children it's easier than you may realize, because there is a strong relationship between traditional activities for that age group and preparation for scientific pursuits.

To plan effectively for science activities with gifted children starting at age three, we need to be aware of: a) the observable traits and behaviors you can expect them to exhibit, b) the goals that are appropriate and achievable with this age group, c) the concepts that should be stressed and, d) the science process skills that they can learn.

ATTRIBUTES OF THE GIFTED

Young gifted children share certain behaviors or attributes with their age-mates but tend to exhibit them more intensely and at an earlier age. They are naturally curious about their environment and physically active in exploring it. Gifted youngsters tend to be uninhibited in talking about their discoveries and in answering questions about their investigations. They are, during this period, developing rapidly both intellectually and physically. They are eager to learn and capable of proceeding with the learning process at a faster pace than are their peers. They are willing to repeat investigations over and over again.

Although research indicates that gifted children pass through the Piagetian stages of development more rapidly than the average child, at this age they are perception bound, i.e., *what they can sense physically is what exists for them.*

Because of these attributes, gifted young children should be given the opportunity to experience and manipulate many objects, both living and non-living. Their classroom and home environments should include a wide variety of objects in order for them to learn-objects to see, hear, poke, prod, pry, sniff, taste, stretch, shake, and touch. Some examples of these objects would include plants and animals, simple tools and building materials, nontoxic powders and chemicals, blocks and unbreakable containers, cooking utensils, balances, a water source or sink close to the ground, and simple machines which they can disassemble and experiment with, such as an old windup clock or a typewriter.

SCIENCE GOALS

Science experiences for young gifted children should include activities that facilitate intellectual and conceptual development. They are the foundation upon which later scientific competence can be built.

Studies have shown that critical growth of neurons and dendrites of the brain occurs until about age six and is partially dependent on the kind and quality of experience that children have in dealing with objects. Language development is another significant goal. During language development words are preceded by mental images, which form as a result of the child's experiences with objects in the environment.

Both teachers and parents sometimes need to be reminded of their extraordinary influence in developing a child's motivation and sense of curiosity. They should encourage questions and invite experimentation, rather than allow classroom routines or other obligations prevent them from sharing in a child's delight at each new discovery. If something seems unimportant to parents, it may soon become unimportant to their child.

Science activities can play a role in a bright child's physical development, as large and small muscle coordination can be enhanced through repeated manipulation of objects and physical exploration of the environment. Social skills are also enhanced through science activities which require cooperation between individuals and among small groups. Science projects can also help these children develop their imaginations. The involvement of an adept adult who is willing to examine many possibilities rather than look for and encourage a pat answer to a problem is especially beneficial.

CONCEPTS

The "big ideas" which can be taught to all children in this age group, but in more depth, more quickly, and with greater understanding to gifted children, include "Objects and Organisms" (taught to older students under the heading "Matter"), "Space," "Time," and "Energy." The topic, "Objects and Organisms," should develop the general cognitive structure that "stuff" or "things" take up room and can sometimes be touched, seen, smelled, tasted, and heard. "Space" refers to the order and relationship of things among themselves, not the "space" of space travel. We can teach children these orders and relationships and give them an understanding that without something occupying it, space is nothing. "Time" as a big idea represents the concepts of past, present and future, and the flow of events-not the position of the hands on a clock. Young children can understand time as it relates to change and should be taught these concepts. "Energy" is the most difficult idea for them to learn because it is the most abstract-still, it can be taught effectively by emphasizing what energy does and what effects it produces.

With very young children, energy can be discussed in relation to kinds of movement such as push-pull, lift-drop, slide-roll. They can be shown that it takes energy to make something move. Older primary children can be taught that it takes energy to do work and that work involves motion. Gifted kindergarteners and first-graders can be introduced to how the amount of energy required to do work can be reduced through the use of simple machines such as the inclined plane and the pulley.

SCIENCE PROCESS SKILLS

By teaching gifted young children science process skills, we give them the tools of learning. Observations, description measurement, and classification are elementary to the scientific enterprise and provide the blocks upon which more sophisticated process skills are built. Some activities that can help develop a gifted child's observation skills include keeping a garden, indoor or out. The child should be encouraged to watch the plants develop and change while keeping a systematic record of observations, such as a series of drawings as a favorite plant grows, matures, and dies. Taking care of a pet, particularly from birth, provides ample opportunity to observe change and has the additional effect of helping develop a child's sense of responsibility.

Descriptive skills can be encouraged by keeping a simple journal incorporating the child's drawings or instant photographs with verbal descriptions written by a teacher or parent. Individual and group discussions encourage verbalization of observations and improve a child's oral descriptive skills.

Measurement skills can be developed through the use of standard and non-standard units. Very young gifted children can be taught to measure with the use of their bodies using "hand" units or "foot" measurements. As the child becomes more skilled and understanding, the parent or teacher can introduce simple standard units, such as a length of string or a stick which is a meter in length. Measurement of growing plants or pets holds a special appeal for youngsters as does measurement of their own growth.

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SCIENCE, from p. 5

Classification skills can be explained and developed through the use of colored blocks, buttons, containers, etc. Children should be asked to sort them according to color, size, shape, or any other category they help identify.

PLANNING SCIENCE ACTIVITIES

Several commercial science programs exist for use with young children, or that may be adapted for use with them. Although these kits are not designed specifically for gifted children, if teachers or parents keep in mind that gifted young children can typically learn more difficult materials more quickly than their age-mates, they can be effective. The *Elementary Science Study* manuals published by McGraw-Hill (1221 Avenue of the Americas, New York, N.Y. 10020) and Delta Education (Box M, Factory St., Nashua, N.H. 03061), *Space, Time, Energy and Matter* published by Addison-Wesley (2725 Sand Hill Rd., Menlo Park, Ca. 94025), and the *Science Curriculum Improvement Study's* (SCIS) "Beginnings" unit published by Rand McNally (P.O. Box 7600, Chicago, Il. 60680) are examples of such programs.

When planning science activities, a three-step learning cycle has been found to be effective. The SCIS steps are Exploration, Expression and Application. This same general format can be used by a teacher or a parent when independently producing a science unit or experience. During the exploration phase the children are given the materials and encouraged to "mess around" or experiment with them on their own. During this phase, the children should be given as much time as they wish, within reason, before moving to the next phase. The expression phase involves a discussion period with the child or children during which the correct labels and terms are given to the ideas and concepts the children have been exploring. The final phase, application, lets the children generalize their new knowledge in a different situation.

For example, when introducing the subject of magnets and magnetic fields to young gifted children, the children should be encouraged to use the magnets on a variety of materials the teacher provides, or on any materials in the classroom which capture their interest (exploration phase). When the children's attention begins to lag, discuss terminology-introduce the name "magnets," and differentiate between objects that a magnet would attract and those it wouldn't attract (expression phase). After the discussion, the teacher or parent could exhibit a variety of new items and ask the children to predict which items the magnet would attract (application phase).

Besides planned units, teachers and parents should take advantage of spontaneous events such as a rainfall or lightning storm to encourage children to observe, experience, investigate, record, and discuss. Teachers and parents should also plan science experiences around the interests of children.

In a systematic way, encourage your brighter students' natural curiosity about their environment. In doing so, you will be laying the groundwork for their future scientific achievement.

[1]Reprinted with permission of the publisher, Allen Raymond, Inc., Darien, Connecticut 06820,from the April 1982 issue of *Early Years* magazine.

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BOOK REVIEW: STRAIGHT TALK ABOUT INTELLIGENCE TESTS

Persons who want sound, comprehensive information about intelligence tests will find Professor (at the University of California in Berkeley) Arthur R. Jensen's *Straight Talk About Intelligence Tests* probably the most clearly written, interesting way to obtain it. The publisher's subtitle for this 283-volume, "Their uses and abuses explained in no-nonsense terms by the world's foremost authority," may seem a bit hucksterish but is accurate. It does not, however, reflect Jensen's style or tone, which are more sophisticated.

Besides a remarkably summarizing preface less than six pages long, the book contains the following seven chapters: The What, How, and Why of Mental Tests; The Structure of Mental Abilities; The Inheritance of Mental Ability; Are Tests Colorblind?; Environmental Influences on IQ; Social Class and Race Differences in Intelligence; and Questions and Answers. These are followed by Suggestions for Further Reading.

The volume is attractively printed and remarkably free from typographical errors. It is obtainable from the Free Press in New York in a hardcover edition (1981, $12.95) and a paperbound edition (1983, $8.95). In the language of *Consumer Reports*, either edition is a "best buy."

BOOK REVIEW

EINSTEIN FOR BEGINNERS WRITTEN BY JOSEPH SCHWARTZ MICHAEL MCGUINNES, ILLUSTRATOR

*Craig Blurton**

When one comes upon a book labeled "for beginners" that is illustrated with cartoons and written about as difficult and esoteric a subject as modern physics it is usually a reasonable assumption that the material contained within its covers will be glib, incomplete, and ineffectual. Joseph Schwartz, an Associate Professor of Physics at the New York City College, and Michael McGuinness, a former art director at *Reader's Digest*, have collaborated in producing a splendid exception to this rule. *Einstein for Beginners*, published by Pantheon Books and sold for $3.95 in paperback, is an intellectual and visual delight suitable for embryonic mathematicians and scientists.

Schwartz' writing is witty and scientifically accurate presenting difficult concepts to his audience of novice physicists in a logical, coherent style that will allow even non-mathematicians in his audience to understand most of the principles underlying Einstein's universe in a rudimentary fashion. When recourse to a mathematical explanation becomes necessary, Schwartz provides a historical framework for the mathematical concepts presented and never requires the reader to attempt more than simple algebraic manipulations. Michael Guinness' illustrations and collages, all in black ink, add additional detail to the text's content, help extend the reader's understanding, and lend humor to a difficult subject.

Through the inclusion of antecdotes about his personal life and quotations, Einstein's humility and compassion as well as his very human frustrations with authority are revealed. An example of the latter is presented at the beginning of the text under a picture of Einstein on a sailboat smoking a pipe. Einstein is quoted as having observed, "If relativity is proved right the Germans will call me a German, the Swiss will call me a Swiss citizen, and the French will call me a great scientist. If relativity is proved wrong the French will call me a Swiss, the Swiss will call me a German, and the Germans will call me a Jew."

The book reveals to the young reader that Einstein was *never* a good student. He was considered slow as a child, failed to graduate from the gymnasium and, when he finally graduated from the university after an undistinguished stay, his professors wouldn't recommend him for a position. This profile of Einstein as a rebellious young student and Einstein's own comments about his education, such as "The teachers in elementary school appeared to me like sergeants, and in the Gymnasium, the teachers were like lieutenants," won't provide an exemplary model of youthful scholarship to contemporary students, but our gifted and talented may be able to identify with Einstein's frustrations of being highly able but being trapped in a lockstep, authoritarian system that was without provision for such ability.

Although the book does provide an historical background of Einstein's times, describe some of his contemporaries, and acknowledge the contributions of fellow physicists including Galileo, Faraday, and Newton, its main purpose is to provide an explanation of Einstein's physics. It does a marvelous job helping us understand why, in the universe of Einstein, clocks slow down as they speed up, people in different frames of reference have different perceptions of reality, and light is the fastest thing in the universe.

It is a fast "read" but one that will provide food for thought well past the time it is retired to the bookshelf. It may be that questions hidden within its recesses could help seed a new crop of young science enthusiasts. At the very least, it can help make sense to nonscientists of a universe apparently beyond the reach of intuitive reasoning. As may be apparent, this reviewer enjoyed it immensely.

The book ends with a quotation that advocates socialism. One is also aware as one reads that the author comes from a "leftist" frame of reference, although that is not meant to imply the text is either dogmatic or that Schwartz proselytizes. It isn't and he doesn't. All things being relative, this political frame of reference, most evident at the end of the book, may please or irritate you. You shouldn't,

however, allow it to dissuade you from purchasing it. It is a highly enjoyable treatment of a very difficult topic appropriate for able junior high school aged youths and up.

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THOMAS PAINE: INFIDEL OR GENIUS?

*Martha N. Barrow**

"Master of inequity and unbelief, drunken adulterer, slovenly, atheist, manic-driven man" (Aldridge, 1959, p. 109) or bold, tenacious, temperate, brilliant, witty, religious, and courteous (Conway, 1970) according to the individual's opinion, Thomas Paine, the man responsible for spreading the aroma of liberty throughout our emerging nation, left behind both admirers and blasphemers to tell the story of his life.

Thomas was born in Thetford, England, a village of 2,000, to Joseph Paine, a poor but reputable staymaker, and Frances, an attorney's daughter "of sour and eccentric character" (Conway, 1970, p. 3). Paine credited his father with giving him, "an exceeding good moral education, and a tolerable stock of useful learning" (Conway, 1970, p. 5). Thomas was raised by the only non-conformist group in town, the Quakers, which is thought to have influenced his own individualism and skepticism of authority and custom (Edwards, 1974). His undemonstrative and continually critical mother's influence can be traced in his grim humor as evidenced by a macabre poem he wrote at the age of eight about the death of a crow (Conway, 1970).

Paine was educated at the Grammer School, his parents sacrificing to pay expenses, from age seven until thirteen (Foner, 1976). This school, unusual for the times, encouraged learning for its own sake. He was considered a "sharp" student of "unsettled application" (Edwards, 1974, p. 8). The Headmaster, Reverend Knowler, found him to be exceptionally able in both mathematics and poetry, an unusual combination and personally continued Paine's education until he had received the equivalent of a secondary education or better (Edwards, 1974). Paine had a persistent interest in science, was highly able in mathematics, but, even though a talented poet, did not pursue the latter because he felt it "too much into the field of imagination" (Conway, 1970, p. 5). Of his education Paine said, "I have seldom passed five minutes of my life, however circumstanced, in which I did not acquire some knowledge" (Conway, 1970, p. 5).

Paine apprenticed with his father as a staymaker but, forever restless, he ran away to sea on the ship "Terrible" at age sixteen from which his father rescued him. Later he actually went to sea on the "King of Prussia" for several years. He became a staymaker in London, later in Sandwich, and at twenty-two was married to Mary Lambert, who died one year later. In London he attended the lectures of the scientists Martin and Ferguson and became acquainted with the astronomer, Dr. Beers (Aldridge, 1959). He also pursued a higher education in preparation for a career as an excise officer and spent time preaching and teaching English (Conway, 1970).

After being dismissed for organizing excise officers, he returned to the excise office in Lewes and met and married Elizabeth, the daughter of a Quaker tobacconist named Ollive. Several years later they were peacefully separated with Paine relinquishing all claims to his wife's property (Conway, 1970).

Paine was considered to be an attractive and brilliant man, a courageous sportsman, with gracious manners. He rubbed shoulders with educated men of some social standing. He played chess, whist, piquet, and cribbage and was noted for his story-telling ability and for obstinate debate. At Lewes, he was active in church and town meetings and in social club gatherings (Williamson, 1973). Paine was particularly "notorious for the quality which has been defined as perserverance" (Conway, 1970, p. 10). He did, however, seem unable or unwilling to cope with life's minor harrassments and wherever he wandered someone cared for him (Hawke, 1974).

Paine spent much of his life in centers of political dissatisfaction and abuse and matured during a time of widespread economic distress (Foner, 1976). He expressed open hostility toward the affluent and claimed that their wealth produced the misfortunes of others. He was the first to call attention to the corruption and negligence in the excise service and, after publishing his first pamplet *Case of the Officers of Excise* at age thirty-five, he was dismissed from office (Edwards, 1974).

After his dismissal, penniless, he returned to London where he witnessed such atrocities as the execution of children for stealing bread and the imprisonment of paupers. Probably influenced by Locke, Descarte, Milton, and others; Paine's belief in human rights and faith in the innate goodness of Man continued to develop, helping him become a committed, courageous egalitarian. At the age of thirty-seven he left London for the New World carrying with him a letter of introduction from Benjamin Franklin who thought he would be useful to America. The transition was more than geographical. Paine left London penniless and virtually unknown and became a man of international reputation; a member of a transatlantic group of intellectuals, reformers, and scientists.

Once in America, Paine wrote for the *Pennsylvania Magazine*, publishing essays against slavery and for liberty. He wrote in clarion tones for the common man translating the advanced thoughts of his times into the vernacular. Paine was devoted to free enterprise, commercial expansion, national development, and the common good. He viewed human nature optimistically, opposed slavery, and had great compassion for the poor. Paine suggested social welfare reforms, defended women's rights, supported the prevention of cruelty to animals, attacked the institution of monarchy, abhorred war, opposed dueling, suggested more rational ideas on divorce, proposed international arbitration, and advocated national and international copyrights. He was the first writer to publically suggest independence (Conway, 1970).

Paine's writings were modern, direct, and forceful - always written with a cause in mind. He edited his works with care and chose his words purposefully. Paine was the "conscious pioneer of a new style of political writing" (Foner, 1976, p. 83). He could create brilliant metaphors while making his language, aimed at the public at large, simple (Foner, 1976). He helped fix the idea of liberty solidly in the minds of Americans with *Common Sense* and *Crisis*, urging them on to freedom and independence.

Although science was his first love, he designed a single arch bridge and smokeless candles (Ricketson, 1978), his devotion to the cause of the common man left him with little time and sometimes meager resources to pursue it.

Paine next traveled to France where he lived for fifteen years. During the French Revolution he opposed the monarchy but spoke out for the life of the king, to no avail. While there he wrote his most controversial work, *The Age of Reason*, which refuted the authenticity of the Bible and questioned many long accepted precepts. He was jailed for political reasons and was only spared from the fate of many of his friends, the guillotine, by a mistake (Foner, 1976).

Paine returned to America during a period of religious revival and intense piety and was greeted with a mixture of affection and abuse, recognition and repulsion. His "heretical" book and Deist's beliefs left him vulnerable to insult and outrage. People found it difficult to set aside his religious beliefs and objectively evaluate the man they once praised. Paine was ill from a paralytic disease and, in his suffering, was said to become slovenly and prone to excessive drinking (Hawke, 1974). Having been snubbed and becoming increasingly bitter, he directed his pen to personal attacks as he never had before. In his last years, he continued to stay informed and to write; pumping out more essays than ever although few were distinguished. Those who visited him found him lucid and alert (Richetson, 1978).

After Thomas Paine's death few Americans spoke well of him until the mid-1820's. Much confusion exists about the last period of his life and he has remained a controversial figure up until the present with biographers seemingly sympathetic or malicious but never indifferent to his character. Thomas Paine was one of the giants of the American Revolution spreading his ideas as though they were spring pollen fertilizing the flowering thoughts of his countrymen.

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THE CASE IN FAVOR OF ACCELERATION FOR ACADEMICALLY TALENTED YOUNG PEOPLE

*Beth Williams**

An accelerated student is one who has completed an educational program in less than the conventional amount of time or is one who enters a program at a younger age than is usual (Pressey, 1949). A controversy exists concerning the effects of scholastic acceleration on the lives of academically talented children. The opposition to more rapid transit through the schooling process seems to draw its impetus from two sources. First, many are concerned about possible psychological effects of acceleration on children.

1. Acceleration may harm the social and emotional growth of students.
2. Acceleration may label students as 'gifted' and therefore mark them as being different.
3. Acceleration pushes children excessively.
4. Acceleration of children deprives them of their childhood.
5. Early ripe, early rot.

(Burroughs, 1979; Daurio, 1979; Gallagher, 1960; Morgan, Tennant, & Gold, 1980; Sears, 1979; Stanley, 1978; Terman & Oden, 1947). Unfortunately, the damage that is caused by not providing an intellectual challenge is typically not considered by those who express these concerns (Daurio, 1979; Robinson, Jackson, & Roedell, 1979; Stanley, 1978). Neither is the research which consistently finds that accelerated students are at least as well-adjusted as their non-accelerated peers (Daurio, 1979).

The second source of opposition to scholastic acceleration is the selective recall of an individual case of an academically talented person who was also socially or emotionally maladjusted (Burroughs, 1979; Daurio, 1979). In these situations however, the incidence of maladjustment in the general population is not usually considered. These concerns persist in the field of education even though reviews of the literature concerning studies of academic acceleration over the last sixty years at all levels, from early entrance into kindergarten to rapid transit through university and professional studies, consistently demonstrate successful results along with a savings of educational time by the accelerated student (Daurio, 1979; Worcester, 1956).

Louis M. Terman began in 1921 an intensive longitudinal study of more than one thousand gifted children that provides insights into the concommitants of acceleration and non-acceleration of gifted students. Terman and Oden (1947) later questioned the gifted adults from Terman's studies after they had completed their formal education and found that the more accelerated a student had been, the more likely it was that the student graduated from college and went on for graduate work. The accelerated group of students also achieved higher occupational success than the non-accelerated group.

Some of the accelerated adults reported having experienced some minor socioemotional difficulties, but they stated the difficulties were temporary and were soon overcome. There was no relation between marital satisfaction and acceleration. Accelerated students were found to be just as happy or happier as adults than their non-accelerated peers.

Hobson (1979) studied the high school success of students who had been admitted to kindergarten at an earlier than conventional age on the basis of psychological and physical tests. The minimum

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'DROPPING UP' AT AGE 16 SIMON'S ROCK: A VENTURE IN 'EARLY' COLLEGE[1]

Thomas Toch[2]

Great Barrington, Mass. - John Donne, the English poet and theologian, entered Oxford in 1584 - at the age of 12. But he didn't have to worry about not having anyone to play with after school. In his time, it was as much the rule as the exception to enter college so early in life.

But today, virtually all American youths must march through 12 grades of elementary and secondary school before they are considered fit for matriculation into college.

Penny Brierley, a good student, found herself up against this system two years ago. Then 17 years old and bored with the education she had gotten through the 11th grade at Holy Savior Menard High School in Alexandria, La., she wanted the challenge of college work but not the pressures that go with being younger than virtually anyone else on campus.

She enrolled at Simon's Rock College, a small school "centrally isolated," as staff members say, between Boston and New York in the foothills of the Berkshire Mountains. It is the only four-year college in the country with a freshmen class made up entirely of high-school-age students. Fifty-five percent of this year's entering class of 115 have completed the 11th grade; 40 percent have finished only the 10th grade. Five percent were in the 9th grade last year.

'BRIGHT, NOT BRILLIANT'

But unlike some colleges - notably the University of Chicago in the 1930's and 1940's and more recently The Johns Hopkins University - they have tried to carve out a niche in their regular undergraduate programs for a handful of adolescent "whiz kids," Simon's Rock accepts only students who wish to start college early and who are "bright, not brilliant." It draws its students from the top half, academically, of all college-bound students.

"Simon's Rock is saying that there are significant numbers of high-school-age students who are ready for a much more rigorous academic challenge than they are being given," said Eileen Handelman, the academic dean of the college, summing up its *raison d'etre*. "We're providing them the elbow-room they need to grow."

"We are trying a serious alternative to what is going on in the American high school," explained Leon Botstein, the president of both Simon's Rock and Bard College, a traditional liberal-arts school that assumed control of Simon's Rock in 1979. "There is no doubt that, in general, kids who come out of the 12th grade have far less to show for it than can be reasonably expected. The fact that our enrollment has risen so confirms this."

In the past three years, the school's enrollment has risen 50 percent, to 308, even though it costs students roughly $12,000 annually to attend. There has also been a steady increase over the past several years in the number of high-school students nationally taking college-level courses through, for example, the Advanced Placement program administered by the College Board or at local community colleges.

Gordon M. Ambach, the commissioner of education in New York, recently proposed that the 12th grade be eliminated in that state, in part, he said, out of a belief that high schools are not challenging many older students.

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ACCELERATION, from p. 1
chronological age for regular kindergarteners was 4 years 9 months by October first but younger children could be admitted if they had a mental age of at least 5 years 0 months. These underage students maintained higher grade point averages throughout elementary and high school and graduated with honors more frequently than their regular age classmates. In high school they participated in significantly more extracurricular activities and received twice as many honors, awards, and distinctions as the older students. A much larger percentage of these gifted underage students was admitted to four-year colleges. The data support the conclusion that early entrance to kindergarten can be a successful method of providing for gifted children. Birch (1954) and Worcester (1956) reported equally positive academic and social-emotional growth among other early entrants to kindergarten and first grade.

Daurio (1979) reviewed twenty studies of children who had progressed more rapidly through elementary, junior, or senior high than was usual. He concluded that the accelerative techniques used, generally grade-skipping and telescoping of several years curriculum into fewer years, resulted in "positive academic performance and social adjustment" (p.48). A 1968 study by Klausmeier, Goodwin, and Teckla found no difference between the academic performance and the school activity and athletic participation levels of an accelerated group of students and their non-accelerated, but bright classmates. Two different groups of accelerated students, one skipping third grade, the other fourth, showed no difference in their academic performance. The conclusions that can be drawn are that students who are allowed to accelerate educationally do not seem to be damaged either academically or socio-emotionally and that there is no single perfect time at which to implement an accelerative technique.

The Study of Mathematically Precocious Youth (SMPY) at Johns Hopkins University offers a range of choices to the mathematically talented young person, including subject-matter acceleration, early entrance to college, and rapid transit through university studies (Cohn, 1980; Stanley, 1978, 1979b). SMPY has found that when students are willing and eager to progress more rapidly through the educational system than is usual, acceleration is nearly always successful.

Children's social and emotional development is closely tied to their intellectual development: a gifted child's social and emotional peer is most apt to be the able child who is a few years older, not the agemate of average intelligence (Burroughs, 1979; Stanley, 1979a). The child who is working in a classroom with intellectual peers is less apt to be labeled as being different or strange by classmates than the one who is in a classroom with age peers and already understands all the material that will be covered during the rest of the school year. What emotional damage could be expected if this child, forced to stay in the latter circumstance, finds it socially advantageous to play dumb and to try to be like everyone else?

"Many [able] students are *eager* to move ahead faster than the usual age-in-grade lockstep. They do so with ease and pleasure" (Stanley, 1979a, p. 98). They are not being pushed into giving up the mythical carefree childhood. They are happily being the children that they naturally are, not being forced into a mold that will never fit them (Burroughs, 1979).

The work by Terman, Hollingworth (1942), and Montour (1978) has shown that the myth of "early ripe, early rot" is a false one. Geniuses whose precocity was fostered at an early age did not quickly "burn out". Those who once had been identified as being gifted children became happy, well-adjusted, successful adults, with those who had been the most accelerated becoming the most successful in their vocations and not falling behind in any of the measures of adjustment.

Sixty years of research has convincingly demonstrated that for the eager, very able learner, acceleration in all of its forms, early entrance to kindergarten, early entrance to the university, grade-skipping, telescoping, and subject-matter acceleration, is an excellent and proven alternative to the conventional age-in-grade lockstep of the educational system. The myths of social and emotional damage have been shown to be contradictory to the evidence. Accelerated students perform as well as, and often better than, the older non-accelerated students in their grade and their non-accelerated agemates in lower grades on both academic and social-emotional measures.

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SIMON's ROCK, from p. 1

Indeed, unhappiness with high school is the main reason why Simon's Rock students, 75 percent of whom are from suburban public schools, go to the college, they say. For many of them, high school was "a cultural and intellectual wasteland."

"It was ridiculous," said Tara Cafiero, a 16-year-old freshman who left public school in Pine Plains, N.Y., after the 10th grade. "You could come in three days a week and get a 90 in the course."

Others say they were ostracized by teachers and other students for expressing alternative views in classes; and many assert they would have dropped out of school if they hadn't come to Simon's Rock. "I dropped up, instead," commented Penny Brierley, the sophomore from Louisiana.

"They tend to be risk-takers," said Nancy R. Goldberger, a clinical psychologist who has spent the past nine years studying the cognitive and affective development of Simon's Rock students, under grants from the Carnegie Foundation and the U.S. Education Department.

"Many were restrained by the rigidness of secondary education," she said. "They had never been given permission to think. They are not unusually bright, but they value their own individuality and respect each other's points of view."

Simon's Rock students, a markedly articulate group of 16-to-20-year-olds, select their studies from an unadulterated liberal-arts curriculum taught by faculty of about 40 (many with Ivy League Ph.D.'s) in a self-contained school community almost two miles from the nearest town, Great Barrington.

The college eases its new students, who this year average 16.9 years old, into a more individualized and rigorous course of study. The small number who enter after the 9th grade take a year-long "Traditional Studies Program," consisting of English, mathematics, science, social studies, and the arts. They also take a three-week intensive writing seminar on campus during the summer before their first semester and attend mandatory lectures on such topics as sexuality and drug use.

Older freshmen also take the writing course (which is new this year), but then move directly into a two-year "General Education Sequence" that includes a semester of science, courses in mathematics, art, and French or Spanish, and a series of three one-semester interdisciplinary seminars on historical, cultural, and moral "perspectives."

The sequence was initiated two years ago. "There was a time when it would have been difficult to impose these kinds of requirements," said Dean Handelman. "Fortunately, the pendulum swings."

HANDLING COLLEGE WORK

Students, according to members of the faculty, vary in their readiness to handle college work.

"Some are as prepared as any excellent college freshman can be; some are still babies and need hand-feeding," said Martin S. Silberberg, a chemistry professor. "The amount of growth in one year, though, is astonishing."

Most students (70 percent last year) transfer from Simon's Rock after two years; many go to Ivy League colleges. Also, it's not uncommon for a Simon's Rock graduate to have a bachelor's degree but not a high-school diploma.

Those who remain - this number has risen steadily since 1976 when the college began offering a bachelor's degree - choose from one of seven interdisciplinary majors, such as "Arts and Aesthetics," "Intercultural Studies," or "Natural Sciences." They are encouraged to take their junior year away from the campus.

Elizabeth B. Hall, headmistress of Concord Academy from 1949 to 1963, founded Simon's Rock in 1964 on the site of her father's former estate, to offer, she said recently, a more challenging curriculum for the brighter girls at Concord Academy.

Her timing probably could have been better. For Simon's Rock - young, vulnerable, and, by design, an "alternative" school - soon found itself engulfed by the "counter-culture" lifestyle of the late 1960's and early 1970's. "It became a place that people thought they could send a problem child to," noted Mr. Botstein.

"Sure, we had our share of drugs and discipline problems," added Dean Handelman, a noted physicist who has been at the college since 1968, "but no more than our share. Unfortunately, a reputation sticks to you like fly paper. We are not a haven for every messed-up kid in the country. Do we take risks? Sure. No 16-year-old should be written off."

In 1970, Simon's Rock became coeducational; in 1979, with 100 students and on the verge of financial collapse, it was taken over by Bard College, 50 miles to the southwest, in New York. Since then the school (now officially called Simon's Rock of Bard College) has experienced something of a resurgence.

GENERAL-STUDIES CURRICULUM

Enrollment is up, to more than 300; at the urging of Mr. Botstein, the new general-studies curriculum was introduced; in 1981, the college expanded its campus by taking over the nearby Fathers of the Sacred Heart Seminary; and officials say the institution's fiscal condition has improved.

Moreover, "the students are more serious, more willing to work than when I came here; they have a clearer idea of what they want," said Arthur S. Hillman, who has taught art courses at Simon's Rock for eight years.

Vestiges of the 1960's linger nonetheless at Simon's Rock. Long hair and Indian skirts are standard attire, and the pungent odor of the clove cigarettes that a preponderance of students smoke lingers in many buildings. ("It doesn't get you high or anything, a lot of people just do it," one student said.) Swimming nude in Ms. Hall's ponds, notes the student handbook, is not acceptable. Nor are waterbeds and coed bathrooms.

Basketball (all teams are coeducational) was added to the athletic offerings (which include karate, backpacking, yoga, scuba diving, aerobics, volleyball, and "frisbee golf," among other sports) two years ago, when the college took over a court owned by a local seminary. There is no football team or stadium, nor are there cheerleaders or fraternities.

There are also the "Granola's," - those students, who, according to one who counts herself among their number, "are into Indian skirts, tapestries, incense, leg warmers (and they don't dance), not wearing bras, and hitchhiking down to New Mexico for the winter solstice." Simon's Rock is still not quite in the cultural mainstream.

That's the way Simon's Rock students seem to want it. "There's just too many things to be concerned about, other than who went with who to the bonfire and who's wearing what clothes," said Karen Conroe, a 16-year-old sophomore.

"In high school, the center of attention is your car and your girlfriend; here it is your work and your ideas," added Brian May, a senior from Chevy Chase, Md. Provost Robert Ackerman says there is a "radically democratic spirit" about Simon's Rock.

Freshmen live together in small, coed dormitories, where they are supervised by "residence directors." Other students, with a few exceptions, also live in dorms or college-owned houses on the campus. Since the school is so isolated, students "tend to have a lot of small parties" in their rooms, they say. A film society shows upwards of 60 movies a year.

There are clearly defined campus rules of social conduct, but they allow Simon's Rock students a good deal more freedom than most of their peers.

SUBSTANTIAL SOCIAL FREEDOMS

It is the willingness of the college to give its adolescent students substantial social freedoms (and, thus, responsibilities) in addition to a more demanding academic program, that distinguishes it from other "early college" experiments and traditional boarding schools, contends Ms. Handelman, the academic dean.

Some students are extremely immature when they get here," she said. "They are dazzled by the freedom, and they have no glimmer that there are responsibilities for yourself that go along with freedoms. On the other hand, we (society) clearly hold adolescents too long in a mode of dependency that is appropriate for children. At Simon's Rock, we're trying to give students a structure in which they make choices. And we're trying to show them that choices have consequences.

"Students in early-admissions programs (at traditional colleges) are out of their league, socially. There is no guidance system for them. But bringing college courses into the high school isn't the answer, either, because that doesn't address the need for adolescents to take greater responsibility for their personal growth. At Simon's Rock, there is homogeneity - everyone is about the same age - and there is a system for making sure that students are thinking about the consequences of their actions."

Under this "system," each student has an academic and residential advisor, whom he or she meets with regularly, both formally and informally. The administration charts students' grades and behavior closely. When there is slippage, the college intervenes, either through the student's advisor, one of the deans, or through the school counseling service, Ms. Handelman said.

"It's an alerting system," noted Ms. Goldberger, the psychologist. "Most of the problems occur among the freshmen," she said. "There's no denying it, it's a really rocky transition."

Students seem to agree. "I went through a period when I wasn't sure I could do the work," said Miriam Shadis, a 17-year-old sophomore from North Edgecomb, Me. Added Ronald Vitz, a sophomore from nearby Saugerties, N.Y., where his father is president of the school

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board: "When you first get here, you are really young; after a year, you wise up."

"Students who come here must have a strong enough sense of self to handle much less structure, an environment where you do not have study halls to fill in all your free time," said Sharon Pinkerton, the director of admissions, who noted that high-school guidance counselors, reluctant to part with their better students, view Simon's Rock coolly.

HALF RECEIVE FINANCIAL AID

About 50 percent of the students in each class receive some kind of financial aid (this year, the average amount is $2,700); minorities make up 7 percent of the student body.

Simon's Rock gets between one-third and one-half of its students through direct-mail solicitations of candidates identified for the college by the Educational Testing Service.

According to the results of Ms. Goldberger's studies, the adolescent students at Simon's Rock have responded well to the increased academic and personal responsibilities they have assumed at the college.

After comparing the development of Simon's Rock students to that of their college peers (who were, on average, two years older) in traditional institutions, including Ivy League schools, she concluded that "they are more sophisticated thinkers. They show a greater awareness of the complexity of issues, demonstrate a greater tolerance of ambiguity, and can handle life problems more effectively. They do not accept top-of-the-head statements; they really listen and know how to talk to each other."

[1]Reprinted with permission from *Education Week*, Vol. 2, No. 29, pp. 12-13.

[2]Thomas Toch is Associate Editor of *Education Week*.

CRISIS![1]

Sava Klein, Ph.D.[2]

THE CRISIS IN SECONDARY SCHOOL SCIENCE AND MATHEMATICS EDUCATION

Our nation faces unprecendented problems in science and engineering education. Most severe of these problems are at the secondary school level where there is a critical shortage of qualified science and math teachers. The paucity of supplies, resources, appropriate materials, and support have reduced the quality of science and mathematics education at the secondary school level to a point that U.S. national security and the nation's efforts toward improved productivity are dangerously threatened.

SHORTAGES OF SECONDARY SCHOOL SCIENCE AND MATH TEACHERS

In the fall of 1980 and again in the fall of 1981, Howe and Gerlovich surveyed the 50 state science supervisors to assess supply and demand for secondary school science and math teachers. Shortages were found for 1980-81, and those shortages have become more severe in 1981-1982. This problem is national in scope; the shortages are critical in physics, mathematics, and chemistry.

SEVERE DECLINE IN NUMBERS OF PERSONS PREPARED TO TEACH SCIENCE AND MATH

In December, 1981 the National Science Teachers Association surveyed 600 colleges and universities that have teacher training programs. Year-by-year data were acquired for the ten-year period of 1971-1980. The results are shocking. There has been a 77% decline in the number of math teachers and a 65% decline in the number of science teachers prepared to teach in secondary schools. Not only has the supply of persons trained to teach science and math severely declined, but the fraction of those trained who go into teaching has also declined.

EMPLOYMENT OF UNQUALIFIED SCIENCE AND MATH TEACHERS

In another NSTA survey, also conducted in December, 1981, and analyzed by James Shymansky of the University of Iowa, secondary school principals provided the information. Among newly-employed science and math teachers, 50.2% were unqualified to teach science or math. They were employed on an "emergency basis" because no qualified teachers could be found. When these data are examined by census region, the results are especially bad in states where high technology industries require the best-trained science and math personnel.

AGES, EXPERIENCE, AND PLANS OF SCIENCE AND MATH TEACHERS

The evidence of a severe shortage of science and math teachers at the secondary school level is overwhelming. To compound this problem, results of an NSTA survey of science teachers show that schools have an aging faculty and that one in four of the younger faculty plan to leave teaching completely. The average age is 41, and the average experience is 16 years. Almost 5 times more science and math teachers left teaching last year for employment in non-teaching jobs than left due to retirement. If the present exodus of qualified science and math teachers from secondary schools continues, the nation will have a net loss of 35% by 1992.

WHAT ARE THE PRIORITY PROBLEMS?

The most critical problems are at the pre-college levels, especially in secondary school science and mathematics. Those problems are, in order of priority:

1) Critical shortage of physics, mathematics, and chemistry teachers at the secondary school level;
2) Substantial numbers of unqualified persons are teaching science and mathematics in secondary schools;
3) Most certified science and mathematics teachers at the elementary and secondary levels are badly in need of in service training;
4) New sequences of science and math courses and materials are needed which match stages of intellectual development of children;
5) Elementary school science consultants are needed who understand science, stages of intellectual development of children, and who know what resources are available;
6) Elementary and secondary schools need access to microcomputers, low-cost supplies, and other resources; and
7) Science curricula need revision, and teachers need training in using new materials and new methods of sequencing content.

[1]This article is a synopsis of excerpts from the testimonies of Dr. Sarah E. Klein before various congressional committees to shed light on the current science education problem. Reprinted with permission from ASTA, Fall/Winter 1982, pp. 10-11.

[2]Sarah Klein is past president of The National Science Teachers Association.

TIPS
(Tips for Intellectually Precocious Students)

STUDY: THE KEY TO ACCOMPLISHMENT[1]

Sanford J. Cohn, Ph.D.[2]

A widely held misconception about gifted students is that they don't have to study hard—and probably don't need the reinforcement of homework assignments so important for their less able peers. Another erroneous notion about the gifted is that if they choose to study hard, their superior ability has endowed them with innate knowledge of *how* to study effectively. Actually, if gifted kids are to master the curriculum and progress in a way that is commensurate with their ability, they do need regular homework assignments and effective study habits like the rest of us.

What do you think the "remainder" would be if you subtracted home study from the life of a highly able student? Let's see what happened to bright youngsters, John and Mary.

John scored extremely high on an intelligence test, and is doing very well in the fourth grade. His report cards show "straight A's," which his parents dutifully reward. Despite John's high level of performance, his parents believe that he is not working near his capabilities. They can't help but notice, for example, that he never seems to do any homework. They recall when they were students getting assigned homework in the lower grades, quite substantial assignments in the higher grades of elementary school and "a ton of it" in junior and senior high. But John hardly ever brings home a book. Could he in fact do more? Was his classwork sufficient to challenge his very able mind?

Would his current level of effort enable him to fulfill his potential? These were pressing questions for John's parents, and they wanted answers. The best route, they decided, was to have John tested to determine the nature and extent of his ability.

John took an extensive battery of specific ability tests: verbal, math and abstract reasoning, as well as skill development tests which included language usage and mechanics, and math. From these tests, a pattern emerged. While John can reason verbally, mathematically, and abstractly like an able but much older youth — his developed skills in expository writing and math were barely above grade level. In analyzing the errors he made on the tests it was clear that John's knowledge of fundamental skills was indeed limited, but only because he hadn't been exposed to more challenging material. He was capable of learning more, much more, but no one intervened to offer guidance or encouragment.

Taking Action. Mary was also a very bright child, but found school "boring" and "dull." She could not find meaning or value in her lessons, and her teachers, she alleged, lacked enthusiasm. The school system appeared to be indifferent to her educational needs, and Mary's response was a generalized apathy and a specific avoidance of homework assignments. When Mary's parents were informed by her teacher of their child's sluggish attitudes, they decided to seek more information about her academic abilities. With this information they would be able to take appropriate action, either with Mary directly, or with the school's seeming lack of interest in Mary's educational development.

These illustrations are actual case studies from the files of the Evaluation Clinic established by Arizona State University's Project for the Study of Academic Precocity (PSAP). They represent a composite of attitudes and behaviors that are often reported to the PSAP Evaluation Clinic counselors and to many other professionals who work with highly able children.

In his studies of mathematically talented youths, Julian Stanley, a psychologist with Johns Hopkins University, found that it's how well a student performs his or her homework that ultimately determines the degree of accomplishment.

We know from our PSAP studies that some very able youngsters act out their dislike or anger toward school in self-destructive ways. There are other able students who obediently complete assignments out of compliance or a need to please (even though the assignments cover material they already know well). A great many bright children are both able and willing to do more challenging work, but it isn't assigned. The real tragedy for these extremely able children is that the modest demands teachers make on them have kept them ignorant of many areas of knowledge they are capable of exploring. They've also missed the opportunity to discover the genuine excitement of learning (even if it's not always fun!). Many gifted kids become somewhat arrogant as a result of not being sufficiently stimulated. "If that's all there is, why bother to learn anything more?" they often say.

Parents become distressed when they see their child's attitude toward school work deteriorating—particularly with highly able children at the threshold of adolescence, but often with younger children as well. Arguments about homework can become an unpleasant family pattern, with parents frequently voicing concern over the poor quality of their child's study habits and homework behaviors.

To Maximize Learning. In the rigorous academic classes offered by PSAP to intellectually talented youths from the ages of six to 15 years, few participants have prior experience with substantial homework assignments. Expectations for excellent homework habits have to be tempered with a strong support system. Students are required to complete lengthy, challenging homework assignments to maximize their learning in classes that meet only once or twice a week. A "Homework Hotline" has been created whereby students can contact their instructors or aides for help at specified times outside of class. Study Skills Workshops are offered for those who recognize that they may need more structure to develop good study and homework habits.

These workshops focus on four essential study skill areas: a) time management skills, b) reading skills with the purpose of extracting information, c) listening and note-taking skills, and d) test-taking skills. Parents are also provided with strategies to help shape their child's homework and study routines. In many cases all the parents needed was our permission to make appropriate demands on their children, which were to be followed by suitable rewards.

The potential of gifted students can be realized only if they are not exempt from the vital, normal routines of teaching and learning. The results of implementing some or all of the study techniques we used with our PSAP children showed very beneficial effects—it was a joy to see the sturdy sense of self-discipline they had developed, with an awareness and respect for the hard work it takes to learn their lessons well.

[1]Reprinted with permission of the publisher, Allen Raymond, Inc., Darien, Connecticut 06820, from the April 1982 issue of *Early Years* magazine.

[2]Dr. Cohn is Director of the Project for the Study of Academic Precocity (PSAP), an Assistant Professor in the Department of Special Education at Arizona State University, and publisher of the *Chronicle of Academic and Artistic Preocity.*

HOW CAN I TELL IF MY CHILD IS GIFTED?

*Craig Blurton**

One of the most frequent questions asked of professionals in the field of gifted and talented education is "How can I tell if my child is gifted?" Due to the natural diversity of children who might be judged gifted or talented, there isn't a universally recognized set of characteristics or behaviors that can be applied uniformly to make such a determination. What, then, is a parent to do when they suspect their child is in some way gifted?

This article will attempt to set forth some constructive guidelines for parents to follow when making a *preliminary* assessment of their child's special abilities. It is hoped it will enable a parent to gather information in a structured manner, make an informed assessment as to whether they should consult with a professional, and, if they do consult a professional, prepare them to present meaningful data which will help the professional evaluate the child's abilities and design an appropriate educational plan. It also offers information about several different identification procedures used by educators and psychologists so that the parent may become a wiser consumer of advice about their child.

It may be useful to begin by pointing out that there is no consensus among "experts" in the field of education of the gifted and talented about what constitutes "giftedness" or what attributes are *certain* indicators of superior talent. Indeed, some professionals (adherents of the "beauty is in the eye of the beholder" school of thought) would argue that all children are "gifted" and that such distinctions are meaningless. This article will take the point of view that while in a general sense it is true that all children are "gifts" to us and have special meaning to the adults in their lives, all children do not have equal abilities in all areas. Gifted children have special educational needs just as do learning disabled or physically handicapped children do.

In trying to define what constitutes giftedness, the general trend is away from global measures such as I.Q. scores to more specific and defined measures of superior behavior. This trend reflects the need for more detailed information to design successful and appropriate educational experiences for gifted and talented children.

I.Q. tests have strong predictive validity for later academic performance but are inadequate tools for educational planning. An I.Q. test measures a wide range of human behaviors and averages the performance of the individual in all of those areas and reports the average as a single score. It is entirely possible for two individuals to take such a test and receive identical scores but be very different in terms of their abilities and educational needs. For example, one child might do extremely well on the verbal reasoning parts of the I.Q. test but poorly on the mathematical parts while another child does the opposite and *both* have identical I.Q.'s. Obviously only one of these children would be educationally served if they both were placed in an advanced mathematics class. An ability test such as the School and College Abilities Test (SCAT), (available from Addison Wesley Testing Service) would differentiate between the two children's abilities and be much more useful in planning educationally for them.

This trend towards the specific should be reflected in your thinking when trying to determine if your child is gifted. Be specific. In what way(s) do you suspect your child is gifted? List them prior to attempting to collect supporting evidence.

Keep a journal or other written record in which you detail behaviors

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GIFTED, from p. 5

which tend to support your belief that your child is precocious in a specific area. Don't be vague and general in your observations. Record that your child read X number of books of Y difficulty in Z amount of time rather than "My child is reading a lot of books for a child his age."

Compare your child's behavior with the behavior of other children of similar age and experience. Does your child really read more difficult material than the other children in his age group? Does your musically talented child appear exceptional when performing at a recital with children of similar age and training? Is your child's interest and ability in mathematics unusual or fairly common when compared to other children? Collect representative samples of your child's work.

If after these initial observations you still believe your child is gifted, approach your child's teacher or another professional with your evidence and solicite their help in gathering more information. Request that your child be evaluated. It is best not to rely on one method of evaluation but rather to try and gather various kinds of information to see if a pattern of superior ability or achievement emerges. Individually, there can be much wrong with various methods of evaluation but when combined a compelling argument can be made for identification as a gifted or talented individual.

Aside from the difficulties already mentioned with I.Q. tests as indicators of giftedness, they have questionable predictive validity when used with very young children. Teacher nomination may be useful when trying to determine giftedness, but teachers can also be notoriously bad selectors of which children in their classrooms are gifted and talented. For example, Dr. Julian Stanley, founder of the Study of Mathematically Precocious Youth (SMPY) at The Johns Hopkins University, has shown that tests are much better locators of mathematical talent than teachers (Stanley, 1976).

Many tests of "creativity" have been developed and are sometimes used to evaluate and identify gifted and talented students. Unfortunately, although certainly an area of interest to all who work with the gifted and talented, such measures have not been found to be predictive of adult creative production, making them of questionable worth. (Mansfield, Busse, Krepelka 1978).

The best tools for the identification of academic and intellectual talent at this time are standardized achievement and ability tests. They work very well in locating specific intellectual and academic talents such as verbal or mathematical reasoning ability. They are also very useful in planning educational options for children gifted in these areas. Unfortunately, no such powerful tool exists yet for identifying children gifted in other ways e.g. artistically, socially, etc.

Perhaps the most questionable technique for locating gifted and talented individuals is checklists of "characteristics." Many such checklists exist but few have proven to be valid or reliable. The development of checklists for use with very young children, a population that other methods have not been effective with, may be an exception.

Once your child has been evaluated and identified as gifted, your responsibility as a parent becomes one of matching your child's educational needs with available resources. Explore critically the school's special programs for gifted children to determine if what is provided matches what your child needs. Don't assume that a program labeled "gifted" is in fact appropriate, many are not.

Look beyond what the school has to offer. Many communities now have a variety of educational opportunities developed for gifted and talented students by private enterprise and parent organizations. Local universities and colleges sometimes offer classes designed specifically for gifted children.

To summarize, if you think your child is gifted:

1. Specify in what way(s) you think your child is gifted.
2. Keep a written record of observable behaviors which indicate excellence.
3. Compare and contrast your child's behaviors with that of other children.
4. Present your evidence to a professional.
5. Request an evaluation but be aware of the limitations of the various methods of identification. Get a composite evaluation comprised of several different methods of identification where appropriate.
6. Actively pursue appropriate educational experiences for your child within the school system and in the community.

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TAPS (Tips for Artistically Precocious Students)

1983-84 THEATRE FOR YOUNG AUDIENCES SCHEDULE ANNOUNCED

The Arizona State University Department of Theatre has announced its 1983-84 schedule of performances for young audiences. The first production, *Little Women* written by Louisa MayAlcott and directed by Johnny Saldana will be performed November 16-20 and November 29-December 4 in the Lyceum Theatre. *The Imaginary Baron*, an original play by Joanna Kraus directed by Donald Doyle, will be performed March 2-4. Both productions will be staged in the Lyceum Theatre.

For further information contact Arizona State University, Department of Theatre, Tempe, Arizona 85287 or call (602) 965-5359.

USING PSAP's TALENT SEARCH AS A TOOL FOR EDUCATIONAL EVALUATION

*Florence Nelson**

The Talent Search for seventh and eighth grade young people who reason extremely well mathematically and/or verbally, sponsored by the Project for the Study of Academic Precocity (PSAP) at Arizona State University, offers participating schools and school districts a unique opportunity to evaluate not only the services they are providing their ablest students, but also other aspects of their program of academic preparation.

The basis of the Talent Search is the youths' taking The College Board's Scholastic Aptitude Test (SAT) at a younger than typical age. The SAT is typically used to assess separately the global development of college-bound high-school juniors and seniors in the mathematical and the verbal areas. When given to highly able seventh and eighth graders (or young people in higher grades who are of seventh or eighth grade age), this test serves as an excellent measure of developed reasoning ability in both of these talents areas that are so necessary for academic success. Since eligibility for the Talent Search is typically less stringent than eligibility for a special program for gifted students, young people who are talented in a particular area, such as mathematical reasoning ability, but not in all areas have the opportunity to get an accurate appraisal of their talents.

When schools or school districts follow explicitly the directions for finding all of their students who meet the eligibility requirements for taking part in the Talent Search and encourage them to do so, they have the distinct opportunity to judge the effectiveness of their own programs to facilitate the educational development of this population against an extremely well validated external measure. Schools with many participants in the Talent Search, substantial numbers of which are also high scorers on the SAT, are demonstrating that their programs are designed to stimulate the academic abilities so necessary to take advantage of higher educational and career opportunities. Schools within the same region or district with low levels of participation by their students and with concommitant low scores among those who do take part may want to beef up their academic preparation during the elementary grades. The availability of such objective data upon which to base management decisions is also useful to substantiate budget requirements.

Norms for the SAT have been established over the past fifteen or so years in all parts of the United States (and in some foreign countries) for use with seventh and eighth grade age youths (typically 12 and 13 year olds). Evidence has been gathered also that demonstrates quite clearly the positive effects of some particular educational alternatives over the standard educational fare delivered in our schools as well as over some other types of special services that are frequently provided

to gifted students as well as their more typical age-mates. In times of diminishing resources, knowing that money spent is being done so wisely and with desired outcomes is increasingly important. By cooperating with all schools and school districts taking an active role in supporting its Talent Search effort, PSAP can help provide valuable feedback in terms of Talent Search participation and score reports to help those educational institutions evaluate the effectiveness of their educational services in terms that relate directly to academic goals.

*Florence Nelson is Chairman of PSAP's Ways and Means Committee, searching for scholarship support for the Talent Search and Academic Classes. She is also the mother of three boys, all of whom are PSAPers.

JOHN VON NEUMANN: PHENOMENAL INTELLECT

*Albert L. Ingram**

John von Neumann was born in Hungary in 1903. He grew up during a time when Hungary was producing an exceptionally large number of outstanding people in diverse fields. Many of von Neumann's contemporaries became world-famous mathematicians and physicists including Leo Szilard, Eugene Wigner, George Polya, Edward Teller, and many others but even in this distinguished group he stood out as "the most brilliant star in this constellation" (Ulam, 1958, p. 1). Some of his contemporaries spoke of him, quite seriously, as a more highly evolved form of life (Heims, 1980). During his years at Princeton a story was current to the effect that he was actually a demigod who had observed humans so well that he could imitate them perfectly (Goldstine, 1972). The fact that those who held these opinions were, in many cases, eminent men themselves (including Nobel Prize winners) is illuminating.

No complete or satisfying explanation exists for the extraordinary number of important thinkers to come out of Hungary at this time. Von Neumann attributed it to the external pressure on the society, to the insecurity felt by individuals, especially Jews, and to the necessity of being outstanding in order to overcome these pressures (Ulam, 1958). World famous physicist Edward Teller also spoke of the pressure to excel or go under. Certainly, exceptional talents allowed individuals to leave dangerous or unstable areas and seek employment in more congenial surroundings. Physics and mathematics, the two fields chosen by many of these people, were easily exportable.

Von Neumann exhibited his gifts quite early and his family, especially his father, encouraged him as much as they could. He was the eldest of three brothers and the household included several younger female cousins. His mother was described as a charming, intelligent woman who devoted most of her life to her family. Von Neumann's father was an upper middle class banker who was given a title by the government of Hungary in 1913 (Heims, 1980).

A number of anectotes have survived from von Neumann's childhood. He had a phenomenal memory. This helped him become an accomplished linguist and an excellent historian, among other things. He joked with his father in classical Greek at the age of six (Goldstine, 1972), and later knew Latin, English, French, and Spanish to some extent as well (Ulam, 1958). When traveling with friends, the youthful Neumann could discuss endless historical facts and analyses about the places they visited. He read constantly.

In addition, von Neumann was an arithmetic prodigy. He could do complex calculations in his head at great speed. Very early, he tended to equate any reflective thought with calculation of this kind (Goldstine, 1972). At the age of ten, the usual age, he went to the Lutheran High School which was considered to be a very prestigious school in Budapest (Heims, 1980). He received almost all "A's" with a few "B's" in Geometical Drawing, Writing, Music, and Behavior. He received "C's" in Physical Education (Goldstine, 1972). Although he didn't actually skip any grades, his math teacher Ladislas Ratz noticed his exceptional ability and recommended that von Neumann's father obtain a special math tutor for him. This was done, and Michael Fekete of the University of Budapest tutored the youngster. Eventually they became colleagues, and von Neumann published his first original work in mathematics with Fekete before leaving high school (Ulam, 1958).

In 1919, following a revolution in Hungary, the von Neumann family left the country briefly, but returned when the government again changed. In 1921 at the age of 17, von Neumann simultaneously enrolled in the University of Budapest and left the country permanently, except for occasional brief return visits. He first went to the University of Berlin and then to the Federal Institute in Zurich. He received a degree in chemical engineering in Zurich in 1925. The next year he received his doctorate in mathematics (with minors in experimental physics and chemistry) from the University of Budapest by returning to Hungary to take the examinations whenever necessary (Heims, 1980).

During his student years, von Neumann continued to do professional work, primarily in mathematics, so that when he went to Gottingen (a center of theoretical physics) in 1926 and Berlin in 1927 he was already recognized as a mathematical genius. During these years he published three fundamental papers on quantum physics as well as work on the foundations of mathematics with Hilbert and, one of the things he is best known for, the fundamentals of game theory (Ulam, 1958).

In 1930, he was invited to come to Princeton University as a visiting professor. The next year the position was made permanent. Von Neumann decided to settle in the United States not because of the persecution of Jews in Europe, which had not yet reached a dangerous level, but because he was ambitious and felt that the opportunities for advancement were better in this country. He joined the Institute for Advanced Studies in 1933, the youngest member admitted (McCagg, 1972).

During the 1930's, von Neumann became interested in problems of hydrodynamics and turbulence. This led to the study of shock and detonation waves. His knowledge was instrumental in developing the atomic bomb during World War II. Although he was a consultant to the Manhattan Project and spent some time at Los Alamos, New Mexico, he did not devote all of his time during the war to this. He found time to consult with several other military projects, publish the important and seminal book *The Theory of Games and Economic Behavior* (1944), and began his work with computers (Goldstine, 1972).

Von Neumann's involvement with computers seems almost inevitable given his range of interests, but it actually resulted from a chance meeting at a railroad station in 1944. After this meeting with Goldstine, von Neumann visited Philadelphia where Ekert and Mauchly were working on one of the first computer systems. He quickly became an important member of this group. In 1945 he wrote a significant paper summarizing his and the group's ideas. Apparently, von Neumann was the first to see the computer as primarily a *logical* device rather than an electronic one, and in his paper he outlined the major parts of any computing system, even today: the central processing unit, memory, auxiliary memory, input, and output. He also saw clearly the utility of stored programs. Although much of this is taken for granted today, at the time it was a leap forward.

In the late 1940's and early 1950's von Neumann expanded his interests to include a general theory of automata (going beyond mere computers) and the application of ideas from computer science and automata theory to the study of the human brain. Many of these ideas are still current. He died in 1957, at the age of 53.

Von Neumann's contributions ranged over a wide part of theoretical and applied mathematics and science. Bronowski (1973) believed that his most original work was in game theory and computer science, but one cannot ignore the many other fields in which he was active. He remained productive all of his life, doing more per year than many others do per decade. In addition to his intelligence, he reportedly had an engaging personality, enjoyed parties, but he did not have any really intimate friends.

Von Neumann grew up in a time and place where apparently it was vital for Jews to excel to escape the worst of prejudices and persecutions. His circumstances enabled him to do so by providing the wealth and opportunities necessary. In general, he applied his remarkable intellect to almost any problem that seemed important to him. He worked long and hard hours, often solving problems more quickly and elegantly than his colleagues. His papers and ideas have had a lasting influence. His contributions can be attributed to his phenomenal intellect and the circumstances that allowed him to develop, refine, and use it.

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CHRONICLE ENDS SECOND YEAR OF PUBLICATION

This issue marks the end of the second year of the *Chronicle of Academic and Artistic Precocity's* existence, a year of expansion and improving quality as we have added new editorial board members and ironed out rough spots in the production and publication procedures. It has been a successful year, helping to establish a continuing tradition of bringing to the Project for the Study of Academic Precocity's (PSAP) patrons and supporters up-to-date, interesting information about the education of the gifted and talented.

As announced in Volume 2, No. 1, the *Chronicle* is fortunate to have added several knowledgable and influential professionals in the field of the education of the gifted to its Editorial Board this year. They are Dr. William G. Durden, Director of the Center for the Advancement of Academically Talented Youth at The Johns Hopkins University; Dr. Wendy C. Roedell, Consultant for the Northwest Gifted Education Center in Seattle, Washington; and Dr. Joyce VanTassel-Baska, Director of the Midwest Talent Search at Northwestern University. Their assistance and contributions are invaluable.

Highlights of this year include the publication of two comprehensive articles in Volume 2, No. 1, describing the now international Talent Search efforts ("Talent Searches: A National and International Effort" by Dr. Sanford Cohn) and their philosophical underpinnings ("Reflections on University-Based Talent Search Programs" by Dr. William Durden), articles addressing the needs of gifted women by Dr. Lynn Fox, Associate Professor of Education and Coordinator of the Intellectually Gifted Child Study Group at The Johns Hopkins University ("Gifted Females: Are We Meeting Their Counseling Needs?" in Vol. 2, No. 2 with Dr. Lee Richmond, Associate Professor of Education at The Johns Hopkins University; "Mathematically Able Girls: A Special Challenge" in Vol. 2, No. 3), and an article by the mentor of much of what we do at PSAP, Dr. Julian C. Stanley, Professor of Psychology and Director of the Study of Mathematically Precocious Youth (SMPY) at the Johns Hopkins University, outlining the need for special educational facilitation for the academically able ("Early Educational Advantages Decisive" in Vol. 2, No. 2).

In addition, this year's final issue, presented in a double volume format to allow us to bring you interesting and important articles too lengthy to present in our usual eight-page format, is edited by Ms. Elizabeth (Jadis) Ullman, a Master's candidate in the area of education for the gifted. Ms. Ullman has worked with PSAP for two years as Director of its Evaluation Clinic under the supervision of Ms. Catherine M. G. Cohn (M.Ed.) and as Associate Editor of the Chronicle under both Dr. Sanford Cohn and Craig Blurton.

In closing, it will continue to be the *Chronicle* staff's goal in 1984 to serve the supporters and clientele of PSAP's research and educational activities by providing them with timely and useful information about the gifted and talented.

Elizabeth (Jadis) Ullman
Editor

SHOULD YOUR CHILD PARTICIPATE IN A TALENT SEARCH?

*by Sharon Higham**

INTRODUCTION

The Talent Search model, which was originated by Dr. Julian Stanley and his associates at The Johns Hopkins University in 1971, has now been extended to include all 50 states. There are five consortia of states that are currently operating university-based talent searches that replicate the original model. They are the Midwest Talent Search (MTS), Northwestern University; Center for the Advancement of Academically Talented Youth (CTY), The Johns Hopkins University; Talent Identification Program (TIP), Duke University; Project for the Study of Academic Precocity (PSAP), Arizona State University; and The Rocky Mountain Talent Search, University of Denver. The five Talent Searches that operate throughout the U.S. may vary in some details but all essentially replicate the searches initiated at Johns Hopkins in 1971.

Briefly, this is the format of the Talent Search: Students who are in the 7th or 8th grade, who have scored in the 95-99th percentile on a standardized aptitude or achievement test of mathematical or verbal ability, are given a Talent Search application by their school principal, guidance counselor or coordinator of programs for the gifted. If they choose to accept this invitation to participate, they complete the application materials, pay a fee of about $21.00 (depending on the Talent Search area), and take the Scholastic Aptitude Test (SAT) in January of any given year. ($11.00 of the total amount goes to the Educational Testing Service and is the standard cost of the SAT. The remaining amount goes to the Talent Search and is used to defray the cost of coordination, mailings, data processing and awards.) Their test scores are returned in approximately one month. The Talent Search director sends a letter to the student recommending certain types of educational options based upon the individual's level of achievement on the SAT and gives each a list of all of the special programs designed for Talent Search participants. Each participant also receives a certificate of merit in recognition of that person's academic potential.

Parents ultimately determine whether or not their child will participate in a Talent Search, since they will probably supply both the fee for the testing and the transportation to and from the SAT test site. Wise parents, however, allow the child to make the final decision regarding participation in the Talent Search. Parents learn of the Talent Search at parent meetings, from magazine articles, as well as through the application materials that their children bring home from school. Often, they are not really sure whether their children ought to participate. They arrive at parent meetings swathed in expectations, some unreasonably high, and others more negative than warranted. (No, the directors of the various searches do not drive Cadillacs or spend their weekends in the Bahamas. The Searches generally operate on a "break-even" basis. Yes, the Educational Testing Service (ETS) is a large business, but a "not-for-profit" business in which profits are turned back into research and development. No, this is not an insidious plot to supply cadres of graduate students with data for their dissertations. But there is some ongoing, carefully directed research

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since responsible educators involved in the Talent Searches should constantly be asking well-formed, intelligent questions, as well as gathering data.) Many of these parents of gifted/talented students have become somewhat jaded, for they have already experienced the disappointment of special programs for their children, programs that failed to deliver what was promised. Fortunately, participation in the Talent Search is voluntary. It is not something to be sold to the public like vacuum cleaners or encyclopedias. All qualifying students need not participate. Parents need to make informed decisions regarding their child's participation in the Talent Search. It would appear to be worthwhile to examine and discuss some of the concerns, expectations and assumptions most frequently expressed by parents.

CONCERN:

THE SAT PROVIDES JUST ANOTHER STATISTIC. MY CHILD IS NOT A NUMBER. I KNOW MY CHILD WELL ENOUGH AND DO NOT NEED MORE TEST SCORES TO TELL ME THAT HE/SHE'S SMART. STANDARDIZED TESTS ARE INHUMANE.

DISCUSSION:

It is true that the SAT (the test designed for high school juniors and seniors in order to determine if they are likely to do well in college) generates yet another three numbers (SAT-MATHEMATICS, SAT-VERBAL, TEST OF STANDARD WRITTEN ENGLISH) to attach to the child, who no doubt has been accumulating a folder full of numbers since he/she began school. However, the SAT scores may prove to be far more meaningful in assessing specific cognitive abilities than any other test score, unless the parents have gone to the trouble of having an individual psychological work-up done by a professional that assesses *specific* reasoning abilities. A student who has consistently scored at the 99th percentile on a standardized test designed for peers of her chronological age has not really been adequately tested. We say that the test's "ceiling" was too low, or that she "fell off the end of the (normal distribution) curve." According to standard psychological testing theory and practice, the child should be given a more demanding test, since the purpose of the examination is to determine the *limits* of the child's abilities, *not* to achieve a string of 99th percentiles. Rick Ronvik, director of programs for the gifted for Chicago Public Schools, perhaps summarized the Talent Search concept best when he said, "You give the smart kids a harder test."

Granted, a score of 650 on the SAT-M may have no intrinsic meaning to a parent or child unless he sits down and does a little homework (materials are provided by the Talent Search coordinator) or unless the next door neighbor's son, who is a senior in high school, just got into MIT. (Many excellent colleges and universities require SAT scores at a certain level in order for a student to be admitted.) But by reading the materials one can find that 650 on the SAT-M is achieved by only 10% of high school juniors and seniors and represents the 90th percentile of the Talent Search participants. This provides a frame of reference with which one might compare the scores of Talent Search participants with those of high school students as well as bright students who are the same chronological age.

Parents tend to be impressed when they hear that the group scores of the 7th and 8th graders who participate in a Talent Search are about equal to or higher than those of the high school juniors and seniors that the test was designed for (and these high school students tend to be an academically superior group, since only students who are considering college take the SAT).

The SAT has a certain mystique about it. It is front page news when the national averages rise or fall a few points. *Time* will run an article on the boy who points out an error on just one of the test questions. The PSAT (Preliminary SAT) is the test used to identify National Merit Scholarship finalists. Mystique aside, the SAT is probably the most respected, best researched, secure, reliable, and valid (for predicting success in college) standardized test in America today. It is available virtually everywhere in the country. This is particularly fortunate for educators wishing to provide special programs for extremely talented students who come from a broad geographic area. Thus, unlike other identification instruments which vary from state to state, school district to school district, and even from school to school within a district, all Talent Search participants take the same test under rigorously standardized conditions. After all, the SAT was developed with the intent of eliminating bias from college admissions practices.

But are not all standardized tests inhumane, biased, and unfair? The criticisms that have been leveled at standardized tests in general can be applied to the SAT. And it *is* comforting to know that there are living, breathing, human beings out there who can recognize that a certain child is bright, while the computer can only read little black marks on a standardized test form. Unfortunately, however, there is fairly good evidence that human errors can be just as devastating, and are perhaps even more prevalent, than those made by machines. Students who are ineligible for "gifted" programs within a particular school district because of past performance (or lack thereof) or incalcitrant behavior, may do quite well on the SAT. But all of these arguments have been made in other articles. In the case of the Talent Search, the individual parents must determine whether the benefits that accrue from participation in a Talent Search are greater than the risks.

High SAT scores also give specific, familiar information to educators who work in the high schools and colleges. While an IQ of 160 is admirable, often the high-school guidance counselor does not know quite what to do with one or with the student who is attached to it. SAT scores are far more familiar to educators and measure special abilities in at least two categories, verbal and mathematical. School people may be more willing to go the extra distance to facilitate the scheduling of the best possible classes for the incoming 9th grader who can demonstrate mathematical and/or verbal ability on a level equivalent to that of some of the outstanding high school graduates. This is not to say that critical educational decisions should be made on the basis of SAT scores alone. But SAT scores may prove to be pivotal when considered in conjunction with other supporting psychometric and/or anecdotal data. They can be used to project success in academic programs and/or exceptional potential in either or both talent areas.

ASSUMPTION:

IF MY SON DOES WELL ON THE SAT, THEN THE PRINCIPAL, COUNSELOR AND TEACHERS WILL FLOCK TO HIS AID AND ALL OF HIS EDUCATIONAL NEEDS WILL FINALLY BE MET.

DISCUSSION:

This particular expectation encompasses two premises: 1. School people will all be familiar with the Talent Search concept. 2. They will be eager to work with the child and provide special programs and/or programming once the SAT scores come back.

Neither premise may be valid. In many states, the Talent Search model has been just recently introduced, and many educators will not yet have heard of it. The classroom teacher is generally the last to become aware of this sort of project. Each year, as more and more students participate, this will change.

As far as the willingness of school personnel to attend to the needs of a child with high SAT scores, the responses have run the gamut from vast and genuine enthusiasm to "So what?" and "Don't bother us." One of the main purposes of the Talent Search concept has been to provide school people with data that indicate that an individual child shows high potential and/or talent in the realm of verbal or mathematical abilities. In many instances the school can be justifiably proud of a child's performance since the scores are, to some degree, a reflection of the quality of the school's educational environment. Hopefully, the school will respond by providing the child with the best possible program available within that school system, each and every day. Perhaps the school is already doing so. Some school systems have responded admirably, using the Talent Search model as a means to introduce special programs in mathematics or in verbal areas. There have been other instances where, as a result of high SAT scores, an individual child has finally been given access to high school classes or other special programs that had previously been unavailable. Sometimes the school has been willing to cooperate but cannot always work miracles for an individual child. If transportation from the junior high to the senior high for a certain class is impossible for the school to arrange, then the parents may have to help out. Like parents of exceptional children who have handicapping conditions, the parents of an exceptionally bright child should come to grips with the fact that they will have to deal with many unusual and sometimes trying situations. Exceptional children, by definition, simply do not do things at the same rate or in the same fashion as most other children. Clearly, the brighter the child, the more difficult it will be to provide a commensurately appropriate education, given the American predilection to a lock-step curriculum.

If the school's anticipated response to the talent search model is a major concern to a parent, then perhaps the wisest course of action would be to discuss this issue with the principal or guidance counselor. If the child received the application for participation in the Talent Search from the school in the first place, then chances are good that the school people will be reasonably well informed and at least somewhat supportive.

ASSUMPTION:

IF MY DAUGHTER DOES WELL ON THE SAT, THEN SPECIAL SUMMER RESIDENTIAL PROGRAMS OR OTHER SPECIAL PROGRAMS WITHIN EASY COMMUTING DISTANCE WILL BE PROVIDED FOR HER *AT NO COST*.

DISCUSSION:

The naivity of the "no cost" element of this assumption is quite astounding, particularly given the current financial climate that most educational institutions find themselves in these days. The programs that have been developed for Talent Search participants generally operate on a "break-even" basis. Vast profits are not being generated from these programs. Colleges are willing to operate this sort of program for a number of reasons, especially since it brings some of the brightest young people in the country onto their campuses at an early age. It also provides a vital and beneficial articulation between higher education and the secondary school. Some colleges and universities, such as Johns Hopkins, Duke, Purdue, Northwestern, and Arizona State, to name just a few, offer summer residential programs of extremely high quality. The cost of a three week residential program usually hovers around $750, which is what one might expect to pay for a good tennis camp of similar duration. Talent Search participants from all over the country may attend any one of these university-sponsored summer programs. The Talent Search consortium listed in the introduction operates at least one residential program. Some scholarship aid is available but, like any other scholarship program, limited.

Commuter programs are another option for Talent Search participants. These programs operate during the summer or during the school year, often on Saturdays. Tuition is much lower, since it need not cover room and board but only teacher salaries and materials. As Talent Search participation grows, so will the availability of high quality commuter programs. However, it is of little comfort to the parents of a Talent Search participant in Ontonogen or Alpena, that several commuter programs for Talent Search participants have been developed for the Detroit-Metropolitan area. At this juncture comes the need for local and regional organization by those involved in education for the gifted and talented. The Talent Search consortium will provide a complete listing of the Talent Search programs, both residential and commuter, available throughout the Talent Search region.

ASSUMPTION:

ACCELERATION IS BAD FOR CHILDREN. EARLY RIPE: EARLY ROT.

DISCUSSION:

This is a myth that should have been laid to rest long ago and that has been addressed extensively in other articles. (See e.g. *"Educating the Gifted: Acceleration and Enrichment"*. eds., S. J. Cohn, W. C. George, J. C. Stanley. Baltimore, MD. The Johns Hopkins University Press, 1979 and *"Intellectual Talent: Research and Development"*. ed., D. Keating. Baltimore, MD: The Johns Hopkins University Press, 1976.) Despite the data to the contrary, the myth still persists and is occasionally dredged up by TV screenwriters who apparently have not had much experience with exceptional talent. Recently, a new television hospital series, "St. Elsewhere", featured a character who was portrayed as a deeply emotionally disturbed genius who thought that he was a bird. In the last episode of his story, he flies off of the roof of the hospital and commits suicide, after explaining to the assembled onlookers that he was pushed into college at an early age. The message was obvious, although pathetically misinformed. Most people who have had their education "accelerated" in some way view it as a positive experience. Few commit suicide. Perhaps there is a script-writer out there who might be willing to deal honestly and realistically with this issue: What is it like for the 1st grader who can read and comprehend the evening newspaper to be told that she must wait eight years for materials appropriate to her reading level to be provided in school?

The issue of acceleration is associated with the Talent Search identification because the special programs developed for Talent Search participants allow them to cover material at a rate commensurate with their exceptional abilities, and this rate is often much greater than that of a typical class.

Important considerations regarding the issue of "acceleration" for a Talent Search participant are reduced to these two: Individual decisions should be made for each person. There are no general formulas for success or failure. If the child is eager and ready to move ahead in a particular subject or even a whole grade, and if the school staff is supportive, then he should be allowed to do so. Holding a bright child back for years and years clearly is neither intellectually nor emotionally healthy for the child. If a child is allowed to move into a certain class sooner than usual, she should not be laden with the impression that the decision has been enscribed in granite. If the child is not comfortable in the new situation, then adjustments should be made.

The second relevant factor has to do with a long-range educational plan for the child. The degree of comfort that a child feels in an educational setting can be determined, to a large extent, by the school people who work with the child, from the principal to the bus driver. Some educators get nervous about options involving acceleration because they fear that parents will make unreasonable demands upon the system. What will happen to the girl who finishes high school mathematics two years ahead of schedule? Parents and school personnel should sit down with the child and map out the long-range educational possibilities. A three or four year plan-of-work is not far-fetched. Children respond differently to this. To some, four years is still a lifetime away and they are not terribly interested. But clearly it is a good idea for parents and educators to have a picture of the alternatives available. Expectations of what will or will not be provided, and by whom, should be well defined.

It is not a good idea to enroll a child in a special program outside of her usual school that is "accelerated" or out of sequence, without first checking with the school and gaining a clear understanding of the follow-up to be provided. Some Talent Search programs provide a format for their potential enrollees that facilitates this.

All Talent Search courses do not involve head-on collision with the issue of acceleration. Classes in PASCAL computer programming or in Philosophy or Latin and Greek do not present a problem since most schools do not usually offer these courses anyway. But Talent Search courses do tend to be content-laden, serious, and challenging. Lest this sound unduly threatening, they are usually perceived as a delight to these students who are hungry for this kind of an opportunity.

CONCERN:

MY CHILD SHOULD NOT BE SUBJECTED TO THE SAT AT SUCH AN EARLY AGE. THE SAT IS TOO DIFFICULT AND TRAUMA COULD RESULT.

DISCUSSION:

When one compares, for example, the 1981 group scores of Talent Search participants with the group scores of the high school juniors and seniors for which the test was originally designed, one finds the following:

MEAN SAT SCORES

	SAT-M MALE	SAT-M FEMALE	SAT-V MALE	SAT-V FEMALE	TSWE MALE	TSWE FEMALE
1981 National high school students	416	390	368	368	--	--
1981 College-bound seniors	492	443	430	418	41.5	42.9
1982 MTS participants	433	401	388	383	38	40

The Talent Search group obtains higher scores than those of the national high school group. This pattern of scoring has been consistent over the years that the various talent searches have operated. Therefore, one could conclude that the SAT is certainly not too difficult a test for this group of exceptional 6th, 7th, and 8th graders.

But parents tend to be more concerned about their individual son or daughter than with group means. What might be predicted for any individual boy or girl? Each Talent Search participant has a slightly better than 50-50 chance of scoring above the mean (for high school juniors and seniors) of the SAT-Mathematics. Also, each child has about a 50-50 chance of scoring above the mean of the SAT-Verbal. (Some children, of course, will score above the means of both and some will score below the means of both.) To someone familiar with standardized testing, this may appear to be painfully obvious. However, bright children (and their parents) are accustomed to receiving test scores that consistently float in the upper strata of percentiles,

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from 90-99th. Although some Talent Search participants will produce outstanding scores at remarkably early ages, most will fall into the middle ranges of a normal distribution curve. This is a desirable outcome. In indicates that the test was appropriate for the group. Talent Search participants should be aware of this, be ready for test scores that fall into the middle ranges, and feel very good if they do. Special programs designed for Talent Search participants generally require SAT scores that fall at the mean or above. The Talent Search materials stress that an invitation to participate in the project is an honor in itself, since only high-scoring students receive an application. All Talent Search participants receive a certificate that praises their academic potential.

However, if a parent has reason to believe that a child will be devastated by scores that do not meet his/her expectations, then the solution is simple. The child simply ought not to participate in the Talent Search at that time. There is no obligation. Seventh graders may participate in 8th grade. Most students seem to understand that this will be a very challenging test (particularly if they had gone over the practice materials provided), and have a very realistic view of their capabilities.

The parents' reaction to the child's performance is an important factor. The parent might discover that the child prodigy is either more or less prodigious than anticipated. Regardless of the outcome on the SAT in 7th or 8th grade, one can safely predict that each child invited to participate in the Talent Search has the ability to be very successful academically. An advanced college degree is not an unrealistic goal, should that correspond with the child's value system and the availability of opportunities. SAT scores, however high, cannot predict who will discover a cure for cancer or write the next Great American Novel. SAT scores indicate academic potential, not a completed education nor an early substantial contribution to human knowledge.

This article provides parents with information to make a reasonably well-informed decision regarding their child's participation in a Talent Search. To summarize, what are some of the circumstances that might render participation in a Talent Search meaningless or ill-advised? If the parents have no interest in SAT scores, think that the personnel at the child's school will not find the scores useful in any way, have reason to believe that there will be no opportunity for or desire by the child to take part in a special program designed for Talent Search participants outside of school, could not care less about the possibility of special recognition for their child through the Talent Search awards ceremonies, and are not enthralled by the practice value of taking the SAT at an early age, then participation in a Talent Search might not be worthwhile. If the parent has reason to believe that the child's psyche is too fragile to handle less-than-spectacular SAT scores at this time in his/her life, then participation might be ill-advised.

On the other hand, if the rapidly growing number of both Talent Search participants and special programs designed for them is any indication, then it appears that the Talent Search model represents a potent means of moving education for the gifted/talented swiftly and, consequentially, forward. It gives individual boys and girls an opportunity to reflect on how they might pursue the best education possible. Talent Search materials suggest many educational options, which include the special programs developed specifically for the participants, as well as other options. The timing is critical. The participation in the Talent Search occurs before the child enters high school and is locked into a standard educational program designed for some non-existent "average" student. As children go through high school, it seems to become more and more difficult to adjust an educational program, due to the nature of the educational system and the social mores of the high school. Involvement in a Talent Search can open doors for a student that can in turn lead to other doors and more and more opportunities. It can give educators and parents a chance to work together, to plan, and to break new ground in order to develop an educational plan based upon the child's special needs. But the child *must* be involved in the planning. One must always listen to the child. Participation in a Talent Search should be viewed as an opportunity that allows some boys and girls to light some intellectual fireworks at a time when life's conflagrations ordinarily take other forms.

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USING STANDARDIZED TESTS TO FIND AND HELP INTELLECTUALLY GIFTED CHILDREN [1]

Sanford J. Cohn [2]

The character of educational programs created to meet the needs of intellectually gifted children has become increasingly academic over the past ten years. Programs for gifted youngsters that provide academic services in "tool subject areas," mathematics and writing, require information concerning a student's abilities and accumulated skills. This information should be collected as part of both the identification and instructional processes. A variety of reliable and valid instruments exists for the purpose of such assessment.

The topic of this paper is to provide a brief review of the kinds of information that are necessary to identify intellectually gifted children, to enhance their educational progress in academically oriented programs, and to evaluate the effectiveness of such educational alternatives in meeting their schooling needs.

IDENTIFYING GIFTED CHILDREN

The Problem with IQ

Since its development, the most widely used instrument for identifying highly able youths has been the intelligence test. In spite of recurrent expressions of concern that these assessment devices might be biased against specific ethnic and/or gender groups, most programs for gifted children use some threshold criterion IQ score for selection. Threshold criteria are typically two standard deviations above the mean for a particular age group, with some adjustments usually made for minority students to account for the alledged bias against them.

Regardless of the type of program into which a student might enter, the use of the intelligence test for identification of gifted youths offers cause for concern. The reason for this concern lies in the structure of the intelligence test itself. Composed of a wide range of item types, including mathematical reasoning items, verbal reasoning items, spatial reasoning items, and abstract reasoning items, the intelligence test results are reported in the highly distilled form of the single IQ score.

Consider, for instance, a hypothetical case in which a young boy is verbally brilliant, but mathematically typical. His verbal aptitude alone allowed him to score high enough on an intelligence test that he qualified to enter his school's program for gifted children. In some frequently occurring programs, this young man would be taken indiscriminantly from his English classes *and* mathematics classes to take part in a special program.

Programs that are similar to this illustration must bear considerable criticism. The mathematics teacher might insist righteously that "this person isn't gifted, at least in my class!" The student might miss needed instruction in mathematics and could even be labeled an "underachiever" because of the discrepancy between his global IQ score and his performance in math class.

While the problems involved with using the intelligence test to select youngsters for programs that avoid intervention in tool subject areas are serious, they are magnified substantially in programs that are intended to develop advanced skills in these basic academic areas. The use of global indicators of ability simply does not provide enough information to determine whether or not a youth is mathematically and/or verbally able, a distinction that is extremely important when instruction in mathematics and/or verbal skill areas is the intended program outcome. Even subscores that indicate a verbal component and a performance component of the intelligence test results fail to provide the necessarily specific information concerning a student's abilities in specific talent areas.

Getting Specific

If one is to offer academic intervention in verbal skill areas for verbally gifted youths, then one must find verbally gifted youths. Similarly, if one is to offer academic intervention in mathematics for mathematically gifted youths, one must find mathematically gifted youths. The identification process must be specific to the type of talented youngster sought (Cohn, Note 1). Getting specific is prerequisite, then, to identifying gifted children and providing them with educational opportunities that are relevent to their talents and interests.

The Two-Step Identification Process

Even within a specific talent dimension one must overcome certain problems if one wishes to determine who, within a given age group, are the most highly able. These problems involve (a) the reliability of a score in the top ranges of a particular test and (b) the fact that we don't really know much about how able the ablest individuals in the top-

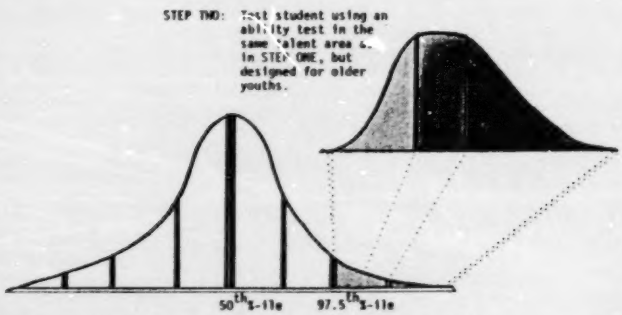
scoring group of a particular test really are. Both of these problems comprise the "ceiling effect."

In order to compensate for the ceiling effect on age-appropriate tests, instruments designed to assess older children in the same talent area are used. The identification process involves two steps: (1) eligibility, and (2) selection.

For illustration, we might want to determine the ablest mathematical reasoners from among a junior high-school age population in order to offer them opportunities to advance in mathematics at a faster than typical pace through challenging subject matter. In order to find such youths, we need to use a test of mathematical reasoning ability, or some measure that tends to be related closely to it (such as a mathematical concepts subtest or a mathematical applications subtest of a typical achievement test battery). But if we use an age-appropriate test of mathematical reasoning ability to find these outstanding youths, we face the problem that we will miss some youngsters simply because of the poor reliability of a test at its ceiling. So few comprise that top echelon of an age-appropriate test that one or two careless errors on the entire test could result in a very able youth's failing to be identified as mathematically gifted. Moreover, if we choose an arbitrary cut-off at a score equivalent to the 96th percentile or better on national norms on an age-appropriate standardized test of mathematical reasoning ability, we merely have an estimate of the level of talent of the least able person in that top-scoring group. There is not enough ceiling in the test to allow the ablest youths the degree of challenge necessary to assess their actual mathematical reasoning ability.

Faced with this very problem, the early staff members of SMPY applied Leta Hollingworth's (1929) strategy of administering tests designed for older youths. In this instance, Julian C. Stanley (1977), SMPY's Director and Founder, decided to offer young seventh and eighth grade age a chance to take The College Board's Scholastic Aptitude Test (SAT).

FIGURE 1: THE TWO-STEP IDENTIFICATION PROCESS


STEP TWO: Test student using an ability test in the same talent area as in STEP ONE, but designed for older youths.
50th %-ile
97.5th %-ile

STEP ONE: Test student using an age-appropriate ability test within a specific talent area (e.g., mathematical reasoning ability, verbal reasoning ability). Students who score in the top few percentiles (usually 96th percentile, ninth stanine, or better) then are invited to proceed onto STEP TWO.

As illustrated in Figure 1, then, the process of DISCOVERING a youth who is gifted in a specific talent dimension consists of two steps. The first step determines a youth's eligibility by means of an age-appropriate test within that talent area. For example, in a mathematics talent search eligibility might be limited to youths who have scored in the top stanine (96th percentile or better) according to national norms on an age-appropriate, standardized test of mathematical reasoning ability (or certain subtests of a similar achievement test battery). This criterion might extend over either of the two most recent administrations of such a test to maximize the elimination of false negatives at this phase of the two-step process. These youths would then be invited to take a test designed for older youths within the same talent dimension.

The second, more difficult test is Step Two of the two-step identification process. As depicted in Figure 1, the tight cluster of youths who scored at the ceiling of the Step One eligibility criterion spreads out across the entire second-screen distribution. In this manner a highly reliable estimate of a youth's actual ability can be determined. The two-step identification process thereby yields an extremely valuable piece of information about the student that can be used directly in his or her educational facilitation. The youth who scores at the top of the second-level screen would likely be able to move faster through more challenging material than one who scores at the bottom of that distribution.

In the decade since it began in 1971, SMPY has worked with nearly ten thousand youths in its six mathematics talent searches. The results of those talent searches are shown according to grade and sex in Table 1. The histograms on the right side of the table indicate the percentage of each group of seventh or eighth graders scoring 500 or better on the mathematics section of the SAT. That score is higher than the average score of college-bound, high-school senior males on SAT-M (494), the most stringent norm group available for this test.

Several important trends are apparent in Table 1. The dark bars represent the males, the light bars females. First, one cannot help but notice the large and persistent sex differences sustained in each group. Considerable study has been devoted to understanding the nature and etiology of these sex differences (Fox, Brody, & Tobin, 1980; Benbow & Stanley, 1980). Second, eighth graders consistently outperformed seventh graders on the SAT, but the three latter talent searches were limited only to seventh graders. The reason for this rather puzzling change lay in Stanley's assertion that too much attitudinal damage had occurred in the eighth graders by their having to endure mathematics classes covering material that they already knew well or could learn instantaneously. Attention was to be paid by SMPY, thereafter, to those younger children who had not yet been "turned off" to school. Above all, however, glancing at Table 1, one cannot help but be impressed by the sheer numbers of seventh and eighth graders who consistently outperformed males four and five years their seniors.

In 1976 SMPY used both the mathematics and verbal sections of the SAT in its research activities. Figures 2 and 3 show the percentages of those seventh-grade participants who performed as well as or better than youths five years older than they did on either or both sections of that test. On the average, significant percentages of boys and girls outperformed the older youths on either the mathematics or the verbal sections of the SAT. A relatively small percentage of them scored at or above this level on both sections of the test (hence the need for specific ability tests).

Although SMPY no longer conducts its mathematics talent searches, The Johns Hopkins University has established the Office of Talent Identification and Development (OTID) to continue the talent search process in both mathematics and verbal areas. OTID conducted its first talent search over a six state region (plus the District of Columbia) in 1980. More than 9,000 youths participated in it. Similarly, significant percentages of youths scored as well as or better than college-bound, high-school seniors did (George, Note 2).

Also in 1980 the newly created Project for the Study of Academic Precocity (PSAP) at Arizona State University conducted its pilot talent search for verbally and/or mathematically talented seventh and eighth graders. A total of 356 youths mostly from the greater Phoenix metropolitan area participated in that talent search. Once again significant percentages of youths did better than the select group of youths much older than they (Cohn & Cohn, Note 3).

Similar activities have been undertaken during the past several years in Illinois (Van Tassel-Baska, Note 4). In 1981 a 13 Southeastern State Talent Search was conducted under the auspices of Duke University, and Arizona saw its first statewide effort.[3]

Perhaps as exciting as these university-based searches for intellectually gifted youths is the application of the two-step identification model within a public school district. Federally funded as a Title IV-C model project in Arizona, Litchfield Park Elementary School District's Project FUTURE (Facilitating Unlimited Talent Using Relevant Education) has applied this process for finding mathematically and verbally able children to students in kindergarten through the eighth grade.

Students who have scored in the ninth stanine according to national norms on an age-appropriate, standardized test of mathematical reasoning ability, verbal reasoning ability, or even on a test of general intellectual ability (special arrangements are made for kindergarteners and first graders) are eligible to take the second-level screen, a mathematical and verbal reasoning test designed for older youths. Table 2 illustrates the target age-level for the second-level screen. Students who scored at the 40th percentile level or better on the second-level screen were invited to participate in Project FUTURE.

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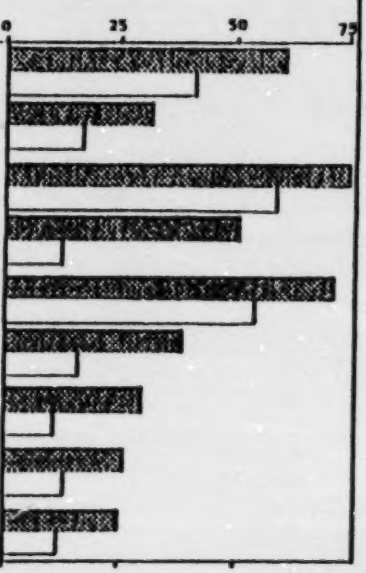
Table 1.

SMPY's Six Talent Searches: An Overview

Talent Search	Grade	Sex	N	Mean SAT-M	S.D.	t, df (p ≤)	N	Percent
			Talent Search Participants				Those who scored at least 500 on SAT-M[a]	
March 1972	8[b]	Male	133	528	105	5.32, 227 (.001)	80	60
		Female	96	458	88		39	41
	7	Male	90	460	104	2.68, 165 (.005)	29	32
		Female	77	423	75		13	17
Jan.-Feb. 1973	8[b]	Male	296	551	85	5.18, 442 (.001)	216	75
		Female	258	511	63		92	58
	7	Male	135	495	85	5.14, 221 (.001)	69	51
		Female	88	440	66		13	15
January 1974	8[b]	Male	556	540	82	7.05, 923 (.001)	395	71
		Female	369	503	72		198	54
	7	Male	372	471	85	4.92, 592 (.001)	143	38
		Female	222	440	68		40	18
December 1976	7[c]	Male	507	458	88	6.77, 871 (.001)	150	30
		Female	366	422	65		40	11
January 1978	7[c]	Male	1549	448	87	11.55, 2796 (.001)	399	26
		Female	1249	413	71		159	13
January 1979	7[c]	Male	2046	436	87	15.61, 3672 (.001)	517	25
		Female	1638	404	77		200	12

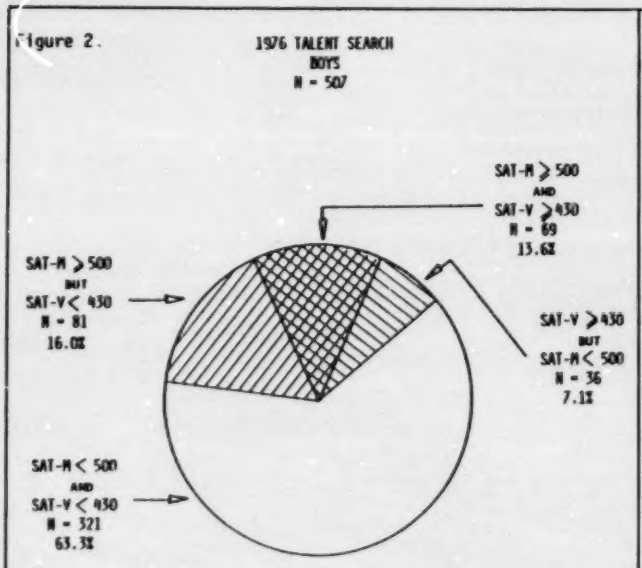


[a]These are youths who scored as well as or better than the average college-bound high-school senior male does on SAT-M (494, according to national norms), the most stringent normative group available for this test.

[b]This category also includes youths who were in higher grades but of eighth-grade age.

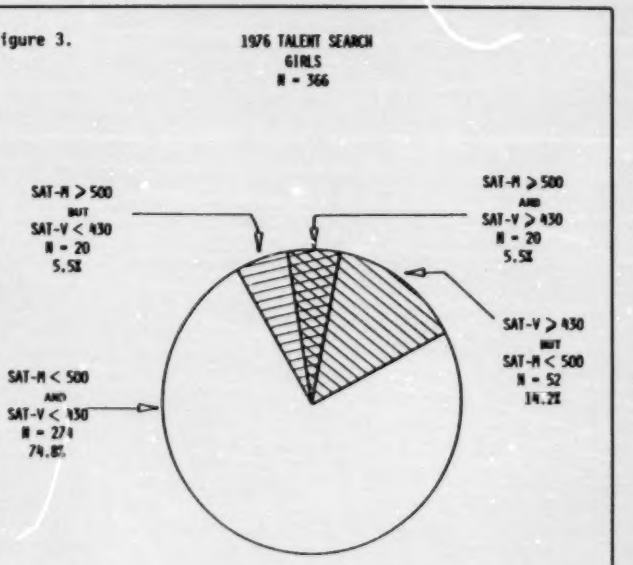
[c]This category also includes youths who were in higher grades but of seventh-grade age. Comparison of seventh graders from the 1972, 1973, and 1974 talent searches with those from the 1976, 1978, and 1979 talent searches must be made with this fact in mind.

Figure 2.



MALES IN THE 1976 TALENT SEARCH WHO AS 7TH GRADERS (OR UNDER-AGE 8TH GRADERS) SCORED AS WELL AS OR BETTER THAN THE AVERAGE COLLEGE-BOUND 11TH AND 12TH GRADE MALE ON SAT-M AND AS WELL AS OR BETTER THAN THE AVERAGE COLLEGE-BOUND 11TH AND 12TH GRADER IN GENERAL ON SAT-V.

Figure 3.



FEMALES IN THE 1976 TALENT SEARCH WHO AS 7TH GRADERS (OR UNDER-AGE 8TH GRADERS) SCORED AS WELL AS OR BETTER THAN THE AVERAGE COLLEGE-BOUND 11TH AND 12TH GRADE MALE ON SAT-M AND AS WELL AS OR BETTER THAN THE AVERAGE COLLEGE-BOUND 11TH AND 12TH GRADER IN GENERAL ON SAT-V. (THE MALE NORMS FOR SAT-M WERE USED BECAUSE THEY ARE MORE STRINGENT.)

Table 2. Grade-levels and age-levels of tests used as second-step screening instruments in the two-step identification process for finding intellectually gifted youths (Tests of specific abilities, such as mathematical reasoning and verbal reasoning, should be used.)

Students' Typical Grade-Placement and Age		Second-step Screen	
Grade	Age (yrs)	Grade	Age (yrs-mos)
Kindergarten	5	First-spring	6-8
First	6	Third-fall	8
Second	7	Fourth-fall	9-4
Third	8	Fifth-spring	10-8
Fourth	9	Seventh-fall	12
Fifth	10	Eighth-fall	13-4
Sixth	11	Ninth-spring	14-8
Seventh	12	Eleventh-fall	16
Eighth	13	Twelfth-fall	17-4
Ninth	14	College Freshman-spring	18-8
Tenth	15	College Junior-fall	20
Eleventh	16	College Senior-fall	21-4
Twelfth	17	Graduate School-entry level	22-8

While the two-step process provides information that is both necessary for identifying youths who are highly able mathematically and/or verbally, the next step in the procedure demands that the youths themselves decide whether or not they will participate in the facilitation offerings. In this way youths who are both *able and eager* can be identified.

DESCRIPTION

Once a student has decided to proceed into a program of educational facilitation, the next step is to determine his or her level of ability in other related talent dimensions as well as his or her level of developed skill in the relevant subject matter. This is the second "D" of the "3-D Model," Description.

Information concerning a youth's abilities in other talent areas is often valuable in providing appropriate educational counseling for mathematically and/or verbally able youths. Spatial reasoning ability, mechanical comprehension, and abstract reasoning ability all play roles in an individual's likelihood for success in certain fields of science. High mathematical talent combined with similarly outstanding spatial ability has been demonstrated anecdotally to allow an intuitive understanding of physics. Other constellations of talents suggest strong potential for success in other scientific fields (Cohn, 1979). For example, the Differential Aptitude Test (DAT), designed for high-school-aged youths, might be appropriate for highly able seventh and eighth graders, in that it offers them substantial ceiling to demonstrate their actual levels of ability in these areas. The problem of test ceiling must be kept in mind in this second phase of the "3-D Model," as well.

Determining the level of skill development simply involves the administration of standardized achievement tests that are appropriate in terms of both subject matter as well as level of difficulty. Tests in which the items are organized according to topic offer a degree of diagnostic capability that is invaluable for determining baseline information in the next phase of the "3-D Model," educational facilitation or Development.

Before we move on to that topic, however, an illustration of the Description process is depicted in Figure 4. Following SMPY's 1976 Talent Search, participants who scored in the top third (when ranked according to the formula 2(SAT-M) + (SAT-V) were invited to return to The Johns Hopkins University campus for a full day of subsequent testing in a variety of ability and achievement areas. Besides interests and values inventories, the following tests were administered that day: the American College Testing Program's Mathematics and Natural Science subtests (ACT-M and ACT-NS, respectively); the Differential Aptitude Test Abstract Reasoning, Mechanical Reasoning, and Space Relations subtests (DAT-AR, DAT-MR, and DAT-SR, respectively); and the Cooperative Mathematics Achievement Test in Algebra I, Form B (ALG-IB). In Figure 4 "box-and-whisker plots" compare the performance of the 188 boys in the SMPY group with the most stringent norm groups available for each of these ability tests. With the exception of the Algebra I achievement test, the comparison group was comprised of 12th grade males (college-bound, for the SAT-M and SAT-V comparison groups). In each case except SAT-V, the seventh grade boys outperformed the comparison group of much older boys on the average. Particularly with regard to the abstract reasoning subtest shown in Figure 4, the ceiling effect was dramatic. This subtest and perhaps the other DAT subtests simply may have been too easy for this extraordinarily able group of mathematical reasoners.

Perhaps the most compelling aspect of Figure 4 involves the seventh graders' performance on the Algebra I achievement test. Nearly all of these youths had not yet taken a course in Algebra. Nevertheless, as a group they scored better than the most stringent norm group available for this test, eighth graders who have already taken an Algebra I course. There is probably no better way to turn off such mathematically able youths towards mathematics and school in general than to have them sit through as many as two or three years of computation and pre-algebra before introducing them explicitly to Algebra I, a subject many of them already understand intuitively.

Similar descriptive processes were conducted by Arizona State University's Project for the Study of Academic Precocity (PSAP) at the start of its 1980 Pilot Talent Search Classes. As courses were offered in mathematics and expository writing, standardized diagnostic achievement tests were administered in both mathematics and verbal areas. Such initial measures offer not only valuable information with regard to the students' levels of skill development, but also provide evaluators the necessary baseline data against which to compare test results at the end of the program.

Once the "Second D," Description, has been completed, students are then offered a number of educational opportunities that are appropriate to their diagnosed levels of abilities and developed skills. This third phase of the "3-D Model" is called Development.

DEVELOPMENT

At a recent symposium concerning the implications of academically oriented programs for intellectually gifted youths for public school systems, Joyce Van Tassel-Baska (Note 5), immediate Past-president of the Council for Exceptional Children/The Association for the Gifted (CEC/TAG), noted three essential components of good programs. These components are enriched curricula in academic coursework, accelerative options, and good educational counseling.

Enriched Curricula in Academic Coursework

Enriched curricula in academic coursework involves both the content of a particular course as well as the style in which the material is presented. Verbally able youths and/or mathematically able youths need to be challenged by material they as yet need to learn, rather than spending time repeating what they already know. In many cases such students are able to handle work designed for much older, able students. Diagnostic testing facilitates the teacher's knowledge of where each student should begin. The student's level of ability and eagerness will determine how fast he or she will traverse the subject matter. A highly individualized educational situation maximizes the learning potential of each student. Individualization does not necessarily mean, however, that each youth must work alone. On the contrary, continuous monitoring of the students' progress will facilitate the teacher's ability to create clusters of youths who need attention in a particular topic on a given day. These clusters will vary continually and may range from a single student to the entire class.

Considerable amounts of homework should be assigned, as this tends to encourage highly able youths to develop appropriate study habits and homework behaviors that they otherwise would fail to do. In both SMPY's and PSAP's facilitation programs, the students' shock at failing a quiz or having to do several hours of homework a night was their first recognition that they had not yet developed skills necessary to realize their extraordinary abilities. Often a structured presentation of necessary study skills, such as time-management, note-taking, and listening skills, can help youths develop these important behaviors. In response to the call for such a structured situation, a Study Skills Workshop was included as part of PSAP's Talent Search Classes.

Accelerative Options

Individualized instruction allows for the possibility of advancing through high level coursework in a given subject area faster than allowed in the typical school system. Starting a course sequence earlier than usual or telescoping more than a single course's worth of material

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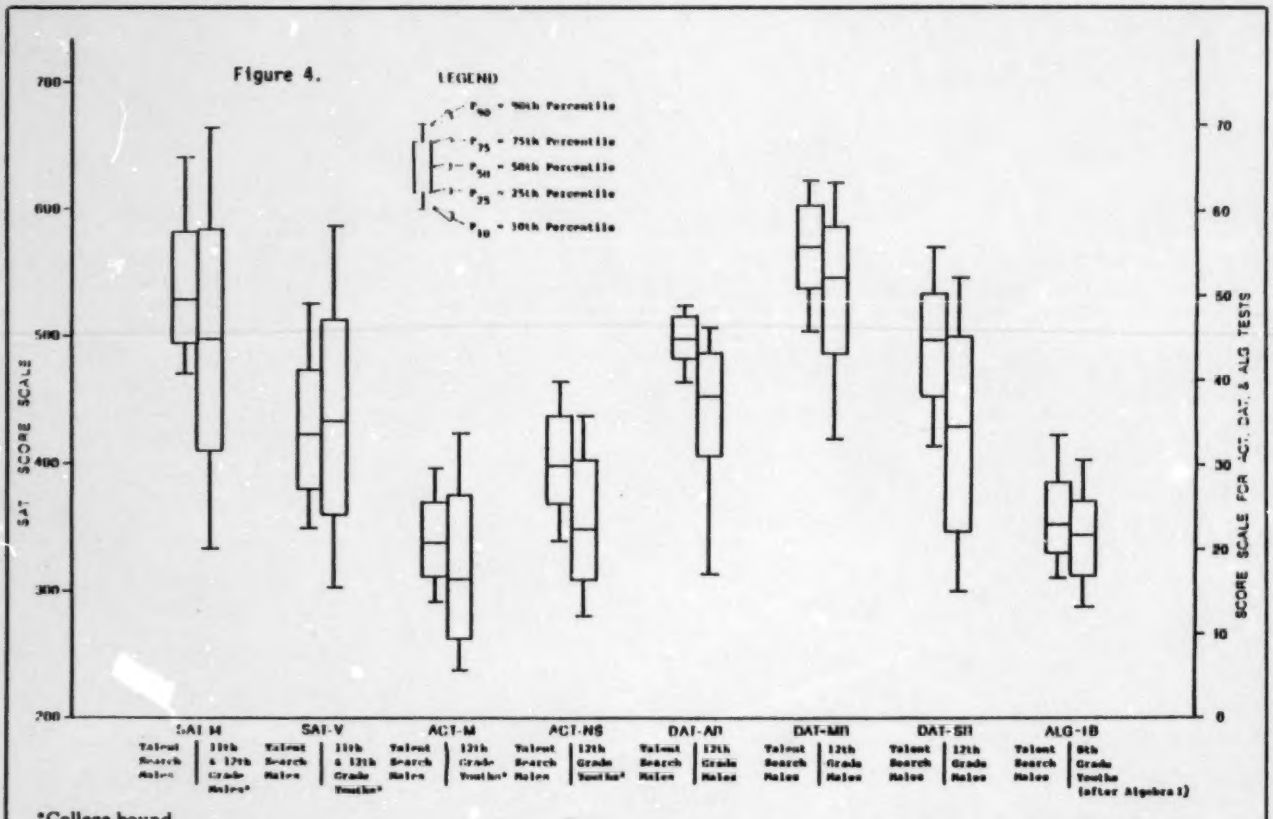

*College-bound

Comparison of scores earned on eight cognitive tests by 7th grade MALES (N = 188) who participated in the December 1976 Talent Search and were called back for further testing with the scores earned by various normative groups of older youths. NOTE: Since the score scales are not equivalent across the different tests, compare the scores earned by the Talent Search males on a particular test with the scores earned by the normative group for that test only.

into a given academic year are but two of many accelerative options that have been studied and advocated by SMPY staff members and others over the past decade. Other methods of accelerating a youth's progress through a particular subject area include taking a high-school or college course while still in junior or senior high school (respectively), working individually with a mentor, and taking The College Board's Advanced Placement Program examinations to earn college credit in eskrow while the student is still in high school or even junior high.

Students who advance in more than one subject area may wish to skip one or more grades or enter college early (with or without having completed high school). Of course, entering kindergarten or first grade early would move one ahead also. Evidence gathered over nearly seventy-five years indicates that far from being detrimental to a youth's intellectual, academic, and social development, taking advantage of educationally accelerative options tends to enhance a youth's development in these areas (George, Cohn, & Stanley, 1979).

A child's development generally involves three arenas; the intellectual or cognitive; the physical or athletic; and the affective or social. When a youth's development in all three arenas is reasonably consistent with his or her age peers, the school can serve as a single situation that fosters development in all three areas. On the other hand, when development in the intellectual or cognitive domain outstrips development in the other two arenas, rather than suppress that extraordinary talent, the youth and his or her family should be encouraged to seek appropriately specific nurturance within each developmental arena. In short, areas of strengths need to be treated as strengths, and areas of typicality need to be treated as such.

Good Educational Counseling

Besides offering able and eager youths programs that allow them to move ahead through advanced course material or even to move ahead of their agemates, the need for excellent educational and career-oriented counseling cannot be overemphasized. Often simply learning that an unusual opportunity exists will not be enough to attract a youth's attention. The potential value of taking advantage of that and/or other opportunities must be elaborated in some instances for the youth to understand the long-term implications of doing so. As our technological society increases in complexity, the time necessary for certification at the doctoral level increases as well. Particularly in mathematics and the sciences, prime creative time spans the late teens through the early thirties (Lehman, 1953). In some cases the certification time uses up nearly half of that prime creative time. Taking advantage of any of several accelerative options fairly early in a youth's educational career might allow for substantially increased productivity and life satisfaction as an adult, as well as the possibility for a youth to explore knowledge in other fields.

Students rarely understand the basis for a particular scope and sequence within a given subject area. Sometimes, counseling can take the form of simply outlining the educational steps one must take to move onto the advanced level subject matter to pique a youth's increased interest in his or her own educational development.

Rarely can one kind of program meet the variety of highly able individuals' educational needs. SMPY referred to the need for a "smorgasbord" of educational options so that the youth and his or her family can select those that match specific patterns of abilities and interests (Stanley, 1977). Counselors need to be aware of this "smorgasbord" of educational alternatives.

Regardless of the educational option that a student chooses, his or her educational accomplishment must be documented so that in subsequent years he or she can be placed in the subsequent, more advanced level courses. The use of standardized achievement tests once again can meet this need. In SMPY's and PSAP's programs students were given alternate forms of the achievement tests that had been used to diagnose areas that needed educational attention. In order for the student to be certified as having "passed" a particular subject, like Algebra I, he or she had to earn a score on the final achievement test equivalent to or better than the 85th percentile of national norms. Thus, students were required to demonstrate proficiency in the subject, not just competency. In courses for which Advanced Placement

examinations exist, students were urged to take them in order to earn advanced standing for college while they were still in junior or senior high school. Standardized tests, then, are especially important to certify the student's accomplishments.

An extremely important aspect of any educational option for able youths is its evaluation. Does the special program succeed in meeting its goals? How do we know whether or not it is working? These are questions of effectiveness and cost/benefit that must be addressed, particularly in times of limited resources. The use of standardized tests in finding and helping intellectually gifted youths along the lines of the "3-D Model" (Discovery, Description, and Development) greatly enhances the evaluation process, as described in the section that follows.

EVALUATION

One particularly important question that should be addressed as part of the evaluation of programs that are designed to meet the needs of intellectually gifted youths centers on the predictive validity of the identification procedure. Do youths who score in the higher ranges of the identification measure (or measures) in actuality achieve at higher levels? In order to answer this question, one must have some operationally defined identification protocol, as well as measures of accomplishment (preferably before and after treatment). The data in Table 3 offer a concrete illustration of this particular evaluation procedure.

Table 3. PSAP's 1980 SUMMER TALENT SEARCH CLASSES

FAST-MATHEMATICS CLASSES

STUDENT	SEX	GRADE	SAT-M	ALGEBRA I	ALGEBRA II	ALGEBRA III	TRIG.	PROBABILITY	NUMBER OF COURSES
01	M	9	660		X	X			2.0
02	M	4	630	X	X				2.0
03	M	7	600	X	X				2.0
04	M	8	600		X				1.0
05	M	8	590		X				1.0
06	F	8	570		X				1.0
07	M	6	560		X	X			2.0
08	M	8	550			X	X	X	3.0
09	M	7	540		X				1.0
10	F	8	530		X	.72			1.72
11	M	8	530	X					1.0
12	M	8	520	X					1.0
13	M	8	520	X					1.0
14	M	7	520		X				1.0
15	M	8	520		X				1.0
16	M	8	500	X					1.0
17	M	8	500		X				1.0
18	M	8	500	X					1.0
19	M	7	500	X					1.0
20	F	7	490	X					1.0
21	F	8	490		X	.70			1.70
22	M	8	490	X					1.0
23	F	8	490	.60					.60
24	M	9	480		X				1.0*
25	M	8	470		X				1.0
26	F	8	470		X				1.0
27	M	8	470		X				1.0
28	F	7	460	.58					.58
29	M	7	450	X					1.0
30	M	8	450		X				1.0
31	M	8	450	X					1.0*
32	F	5	450	X					1.0*
33	M	8	440	X					1.0
34	F	7	440	X					1.0
35	M	7	440	.70					.70
36	F	7	440	X					1.0
37	F	7	430	X					1.0
38	M	7	430	X					1.0
39	F	7	420	.52					.52
40	F	7	420	.70					.70
41	M	7	410	X					1.0
42	M	7	410	.65					.65
43	M	7	400	X					1.0*
44	M	7	400	.68					.68
45	M	8	400	X					1.0*
46	M	7	400	.32					.32
47	M	7	380	X					1.0
48	M	7	380	(Dropped)					0.0
49	M	7	380	(Dropped)					0.0
50	F	8	380	(Dropped)					0.0
51	F	8	380	.68					.68
52	M	7	380	(Dropped)					0.0
53	M	6	370	.40					.40
54	F	7	370	X					1.0
55	M	7	370	X					1.0*
56	M	7	370	X					1.0
57	M	7	360	.60					.60
58	M	7	360	.48					.48
59	F	7	360	X					1.0*
60	F	7	350	X					1.0*
61	F	7	350	.70					.70
62	M	8	350	X					2.0
63	F	6	340	.58					.58
64	F	8	340	X					1.0
65	F	7	320	.38					.38
66	M	8	330	.58					.58
67	M	7	330	.48					.48
68	M	7	320	.42					.42
69	F	8	320	X					1.0
70	M	7	310	.48					.48

Mean SAT-M	=	442.0
S.D. SAT-M	=	83.3
Mean # Courses	=	.94
S.D. # Courses	=	.51
r	=	.59
p	<	.001

*These students certified on the final examination when given additional time.

Seventy students took part in PSAP's 1980 Pilot Summer Talent Search Classes in mathematics. Youths who scored 300 or better on SAT-M were allowed to take part in these classes. (Please note that this entry criterion is significantly lower than those used by SMPY and other projects. The fact that this was PSAP's pilot effort played some part in the choice of this threshold score, as did PSAP staff members' interest in studying the predictive validity of the SAT-M.)

On the left side of Table 3, students are ranked according to their SAT-M scores from highest (660) to lowest (310). The average score for this group was 442; no statistically significant sex differences were found. On the right hand side of Table 3 are listed the number of math courses completed by each student. A student was assigned a 1.00 in a given course if he or she earned a score equivalent to or better than the 85th percentile of national norms on the final certifying achievement test. For youths who did not meet that criterion the percentage of items that were answered correctly on that test are shown as an estimate of the fraction of the math course that was completed. On the average both boys and girls covered nearly one-year's worth of mathematics in 40 hours of instruction over an eight-week summer course. Classes met for five hours once a week. Homework assignments were substantial, and there was a "homework hotline" for students to have questions answered outside of classtime. The correlation coefficient between the predictor variable (SAT-M) and the outcome variable (amount of mathematics completed) was 0.59, statistically significant at the .001 level. The evidence provided by this evaluation procedure strongly suggests that the SAT-M is indeed a valid predictor of accomplishment in a special summer mathematics class for highly able students and deserves to be used again in subsequent identification protocols.

An introductory college-level computer science course was offered to those youths who were also taking the mathematics course. The data in Table 4 demonstrate the relationship between the predictor variables (the SAT-M, SAT-V, and the Watson-Glaser Test of Critical Thinking) and the outcome variable (score on the final examination regularly administered by the professor teaching the course to students in his college class). The strongest positive relationship between predictor variable and outcome variable was shown between the sum of SAT-M *and* SAT-V (rather than SAT-M, alone) and the raw score on the final exam. In subsequent iterations of the PSAP Summer Talent Search Classes, eligibility for the computer science course was determined according to a summative criterion (SAT-M + SAT-V).

Table 4.

PSAP's 1980 SUMMER TALENT SEARCH CLASSES

Computer Science Class

	SAT-M	SAT-V	W/G	FINAL
N	22	22	21	21
Mean	482.3	399.5	68.2	54.3
S.D.	90.0	109.5	12.5	20.2

Pearson Product-Moment Correlation Coefficients

(N = 21)	SAT-M	SAT-V	SAT-M+V	FINAL
W/G	.76	.78	.80	.77 (20)
FINAL	.66	.71	.82	

NOTE: 18 boys and 4 girls participated in this class.

In addition to determining the predictive validity of the identification protocol, one might simply wish to document the educational growth, if any, of the group as a whole. For the mathematics classes, this was rather easily accomplished by totaling the number of mathematics courses that had been completed at proficiency level (or the estimate of the fraction of the course that had been completed). In the expository writing classes, in which no such clearly delineated

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"course's worth" of subject matter is available, exit scores on appropriate achievement tests (The College Board's Test of Standard Written English and the Sequential Tests of Educational Progress in English Usage and Mechanics of Writing) were compared with entry scores on alternate forms of those measures. These results are shown in Table 5.

Table 5. PSAP's 1980 SUMMER TALENT SEARCH CLASSES

EXPOSITORY WRITING CLASS

TEST DATA[a]

Pre-Class Scores[b]	SAT-V	READ	VOCAB	TSWE	ENG EXP	SPELL	CAP	MECH TOTAL
Mean	420.3	41.3	42.8	41.0	39.3	29.5	29.7	58.9
Percentile[c]	47	41	51	39	52	59	56	60
S.D.	103.1	10.3	9.7	9.7	8.5	8.0	7.0	14.0
Post-Class Scores[d]								
Mean	433.8	46.3	39.4	47.4	43.6	31.7	32.7	64.4
Percentile[c]	51	58	38	60	67	63	71	68
S.D.	103.3	11.2	9.7	10.5	9.2	7.8	6.1	12.6
t-value	1.44	5.35	-3.96	5.63	5.08	2.51	4.64	4.78
df[e]	33	33	33	33	32	32	32	32
p <	n.s.	.001	.001	.001	.001	.02	.001	.001

[a]The tests that were administered are as follows. Alternate forms of these tests were given as post-assessments.
SAT-V = Scholastic Aptitude Test, Verbal Section
READ = Scholastic Aptitude Test, Reading Subscore (Verbal Section)
VOCAB = Scholastic Aptitude Test, Vocabulary Subscore (Verbal Section)
TSWE = Scholastic Aptitude Test, Test of Standard Written English
ENG EXP = Sequential Test of Educational Progress (STEP), Series II, Level 2 (9th grade through 12th grade), English Expression
SPELL = STEP, Series II, Level 2, Mechanics of Writing, Spelling Subsection
CAP = STEP, Series II, Level 2, Mechanics of Writing, Capitalization and Punctuation Subsection
MECH TOTAL = STEP, Series II, Level 2, Mechanics of Writing, Total Score

[b]N = 35 (16 boys and 19 girls) One boy dropped out after one week (not included).

[c]College-bound, high-school senior norms were used for Scholastic Aptitude Test scores. Twelfth-grade norms were used for the STEP, Series II, Level 2 test scores.

[d]N = 34 for SAT scores; N = 33 for STEP scores. Two students were absent for the final class session during which final testing occurred. One student did report for a make-up testing session for the SAT. Both absentees were girls.

[e]df = n - 1, where n is the number of pairs of scores.

Inasmuch as verbal reasoning ability, according to The College Board, is developed over one's lifetime, PSAP staff members did not expect to see much growth in SAT-V scores of the 34 participants in the expository writing classes. No statistically significant change was shown in SAT-V scores. (The changes in the reading and vocabulary subtest scores of the SAT-V are uninterpretable, as the reliability of these subtest scores is too low.) On the other hand, scores on the Test of Standard Written English (TSWE) were expected to increase. They did remarkably so, from 41.0 (39th percentile of college-bound seniors) to 47.4 (60th percentile of college-bound seniors). This is a statistically significant increase at the .001 level. Moreover, only one youth had scored a ceiling 60+ score at the start of the expository writing class, whereas seven such ceiling scores were noted at the end of the program. Similarly large and significant gains were shown on the other achievement tests, which were administered as measures of reliability across different instruments. Clearly, the expository writing curriculum that focused on vocabulary development, grammar, syntax, semantics, and rhetoric provided these youths with skills necessary to perform well on advanced level achievement tests of the proper usage of the English language. Besides using standardized tests to assess the students' growth in writing ability, detailed analyses of their compositions were undertaken. Too lengthy to be described in this paper they are elaborated in detail along with an extensive outline of the expository writing curriculum elsewhere (Norris & Cohn, Note 6).

As these examples have illustrated, the use of standardized specific ability and achievement tests greatly enhances the evaluation process of academically oriented programs for intellectually gifted youths.

SUMMARY

Standardized tests are valuable tools in all aspects of educational programming for intellectually gifted students. Tests of specific abilities can serve as the bases for identification protocols. Within a given talent dimension, tests designed for older students can operate as second-level screening instruments to provide reliable estimates of a youth's actual ability in that particular talent area.

Youths who are identified as highly able in a given talent dimension then can choose to take part in educational facilitation that involves relevant coursework. Standardized achievement tests (preferably those for which the test manual provides a topical organization of the items) can be used as diagnostic measures to determine the points in the subject-matter in which the student needs attention. Such information not only is useful for individual students in programs that offer individualized, diagnostic and prescriptive instruction, but it also provides baseline date necessary for program evaluation.

Students' accomplishments at the end of an academically oriented program can be documented by using alternate forms of the standardized achievement tests that had been used initially to diagnose areas in need of educational attention. Such documentation is extremely important for students' subsequent appropriate course placement. Moreover, the certification of the students' achievement provides important post-treatment measures that are necessary for program evaluation as well.

Appropriate use of standardized tests can aid in all phases of continuous educational programming for intellectually able youths from pre-school through the college years: Discovery; Description; Development; and Evaluation.

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Footnotes

[1]This paper was presented at the Large School Systems Invitational Conference on Measurement in Education, New Orleans, Louisiana, May 1980.

[2]Dr. Cohn is Assistant Professor in the Department of Special Education, Arizona State University, where he is also Director of the Project for the Study of Academic Precocity (PSAP) and publisher of the *Chronicle of Academic and Artistic Precocity*. He was formerly Assitant Director of the Study of Mathematically Precocious Youth (SMPY) at The Johns Hopkins University.

[3]For a more detailed description of the growth of the Talent Search effort to span the United States and Canada, see Cohn, S. J. Talent searches: A national and international effort. *Chronicle of Academic and Artistic Precocity*, 1983, *2*(1), 1-3.

ON EDUCATING THE GIFTED[1]

Julian C. Stanley[2]

This article explores current thinking on ways to improve the education of intellectually talented youths. The term "intellectually talented" seems, for several reasons, preferable to the more commonly used expression "gifted." In this article, I consider just those specific developed abilities that make some students especially educable within the broad context of schools. The aggregate of several such abilities can provide a measure of general intellectual ability, usually represented by an age-adjusted score called the IQ. In essentially its present form, the concept of general intelligence dates back to Spearman (1904) and Binet (see Binet & Simon, 1905). Perhaps this construct-validated concept is still operationalized best via a child's carefully ascertained standard-score IQ on the Stanford-Binet Intelligence Scale when he or she is about 7 to 12 years of age. If the educator could have but *one* indication of a youth's intellectual ability, this would probably be the best. Later, I shall question the wisdom of relying heavily on a single such score.

To most knowledgeable adults, a "gifted" child is one whose Stanford-Binet-type IQ is "high." Typically, the minimum criterial score is set at 130, 132, 140, or occasionally 150 or even 180 (e.g., see Hollingworth, 1942). It is usually assumed, often tacitly, that all students with a given IQ such as 140 are equally educable in the usual school subjects. For example, when a high-IQ youth performs poorly in a mathematics class set up for intellectually brilliant students, the teacher is likely to conclude that he or she is not adequately motivated and, therefore, not "working up to capacity." Actually, of course, some students reason mathematically far better than do others of exactly the same chronological and mental age. Using only IQ or MA scores to group pupils homogeneously for instruction in mathematics if foredoomed to be inefficient compared with grouping based on more relevant criteria.

This points up the need for frequent use of tests or other assessments of special abilities that, singly or in combination, provide a more valid basis than the IQ for instruction of youths talented in a given school subject. Which measures prove optimum will depend considerably on the type and pace of instruction in the special class. For the 12 fast-paced mathematics classes conducted thus far by the Study of Mathematically Precocious Youth (SMPY) at Johns Hopkins, a high score on a difficult test of mathematical reasoning ability, augmented by a good score on a test of reading comprehension and vocabulary, has been found to be powerful. Many 10- to 12-year-olds who are in this category have been able to get certified via standardized achievement tests for more than 600 hours of precalculus mathematics (Algebra I through analytic geometry) in approximately 40 hours of instruction and testing.

This, then, is my first point about the state of the art concerning education of the gifted; there seems to be too much emphasis on IQ as the primary homogeneous grouping variable for instruction.

Even more troubling to me, however, are the flight from the use of tests for identifying talented youths and the strong prejudices held by many educators and parents against accelerating these youths academically. These are not new concerns, of course. They are featured prominently in Spaulding's (1975) "review of the state of the art on research on the gifted and talented . . . for the period 1969-74" that was done for the American Psychological Foundation. In fact, the prejudices were obvious in 1921 when Terman began his now classic *Genetic Studies of Genius* (see Gowan, 1977; Terman et al., 1925). The perennial arguments against and for standardized tests are not reviewed here, but probably you, too, are concerned lest certain alleged or real misuses should cause them to become unavailable. I realize poignantly, on the basis of my testing experience since 1938, the great value of standardized tests for *finding* talent (Stanley, 1977-78). We appear to be in danger of losing some of that capacity in the name of the current "truth in testing" legislation.

Accelerating the subject matter and/or school grade progress of intellectually talented youths has a long history of successful outcomes. As far as Daurio (1979) could ascertain in his recent, comprehensive review of the acceleration versus enrichment controversy, not a single substantial *study* has found the educational acceleration of intellectually talented youths harmful. Also, Daurio could locate almost no studies of so-called educational enrichment that found it as effective as acceleration. Apparently, successful subject matter enrichment at one level must lead to acceleration later in order to avoid boring the student and causing him or her to lose interest in the subject. This certainly has been SMPY's finding with many hundreds of youths over a 10-year period. (See Fox [1979]; Keating [1976]; Keating & Stanley [1972]; Stanley, Keating, & Fox [1974]; Stanley, George & Solano [1977, 1978]).

As concluded by Daurio and others contributing to SMPY's most recent book (George, Cohn & Stanley, 1979), properly conducted acceleration tends to be enriching, and appropriate enrichment is deliberately accelerative. Thus, as the subtitle of the book (Acceleration and Enrichment) indicates, it seems advisable not to contrast acceleration with enrichment as if they were mutually exclusive. Various combinations have produced happy, effective students who completed their baccalaureates 0 to 8 years early.

This leads, naturally, to the concept of a smorgasbord of special educational options that might be sampled freely by intellectually talented youths. Some of these will be primarily enriching, whereas others will be chiefly accelerative. Each intellectually talented youth must have considerable guidance in order to use these options to further his or her own education most effectively.

First, though, the various abilities of the intellectually talented youth must be well known. Some multiability method such as administering the eight Differential Aptitude Tests (DAT) is needed to find those youths who meet a criterion such as scoring in the upper five percent of their age group on the national norms for at least one ability. In a typical school, that will yield far more than five percent of the students tested. The criterial percentage should be set so that false negatives will be minimized. For example, SMPY permits youths on upper-three-percent mathematical aptitude to enter its talent search in order to make fairly certain of screening in for more difficult testing students who reason better mathematically than do 99 percent of their agemates.

After identifying the high scorers on one or more of the eight tests, it is necessary to administer a much more difficult test of the specific ability or abilities on which the individual excelled. In addition, various self-reports and other information about the student should be secured; these help determine which youths have the ability to forge ahead fast and well in certain subjects or other activities. The titles of the DAT tests suggest ways to relate them to school subjects, but far more research on this is essential: Verbal Reasoning, Numerical Ability, Abstract Reasoning, Mechanical Reasoning, Space Relations, Language Usage, Spelling, and Clerical Speed and Accuracy.

A rather recent development that, as usually applied, seems to me unfortunate is preparation of "teachers of the gifted." Who can be trained to meet all the subject matter needs of youths highly talented in one or more subjects? In mathematics, the situation is especially difficult because most elementary or junior high school teachers simply could not provide or supervise suitable experiences in this subject for highly talented youths.

Instead of teachers of the gifted, it seems to me that coordinators of special experiences for these youths are needed. These coordinators are a special kind of educational guidance counselor seeking resources and flexibility suited individually to each student.

Related to teachers of the gifted is strong emphasis on what I would term "creativity" essentially divorced from academic subject matter.

cont'd. on p. 12

Such activity, carried along partly by the glamour of the word "creativity," seems to have been derived chiefly from the important work of Guilford (see Michael, 1977) and Torrance (1977). Such approaches often strike me as erring in much the same way that the training of mental "faculties" did many years ago. Even if stable mental factors can be isolated via factor analysis (and Harris & Harris [1971], and Horn & Knapp [1973, 1974] have cast doubt on Guilford's Structure of Intellect model), this does not mean that they can be improved by training, or, even if they can, that this would have beneficial effects for learning school subjects.

Torrance's emphasis on making students "creative" often leads to the teacher's spending considerable time trying to train the presumed trait, creativity. Since two educational activities cannot occupy the same space at the same time, I wonder to what extent the displacement of emphasis on school subjects instruction in favor of such "academically irrelevant enrichment" (Stanley, 1976) (As much creativity training is), has contributed to the present test-score decline. To me it would seem better to handle subject matter, itself, "creatively" rather than to work directly on creativity. Even such activities as "brain-storming" can readily be related to specific subjects. In my opinion, much of the recent emphasis on so-called creativity in our schools is faddish and naive.

It is at the level of differences *within* individuals across abilities that the most glaring problems become apparent. No single school program for "the gifted" can adequately meet these differential needs. For example, if Susan reasons extremely well mathematically and is eager to move ahead faster and better in *mathematics*, her most pressing intellectual needs will not be met well by even the best imaginable special course in social studies, French conversation, or even computer science or chess. She needs the appropriate level and pace of *mathematics* now, not as a sit-in-the-corner, independent studier but, preferably, with several other students who are also math-able and eager. Perhaps a mathematics course such as college algebra and trigonometry, taken as a part-time student in college or in high school several years ahead of her grade placement, will be excellent for her. Perhaps, instead, she needs a fast-paced math class on Saturday or Sunday afternoons for herself and students like her.

As noted earlier, since June 1972 SMPY has run a dozen such classes. Their chief purpose was to help well-qualified youths learn mathematics from Algebra I through the first year of college calculus as quickly as possible, depending on their abilities and motivation. While doing this, SMPY developed its "diagnostic testing followed by prescriptive instruction" (DT ► PI) method of individualizing the learning of mathematics in a class context (Stanley, 1978). This approach owes much to Glaser's (1977) individually programmed instruction procedures, but little to "[t]he dominant instructional model within special education, Differential Diagnosis - Prescriptive Teaching" (Arter & Jenkins, 1979, p. 517).

In principle, the DT ► PI method is simple. We find out what the math-able student does *not* yet know about a school subject such as Algebra I and help him or her learn just that. No time is wasted on repetition of what is already known, as may be done in the usual school class where there are many pupils who cannot easily grasp the concepts.

A brief description of how SMPY's fast-paced math classes were conducted last summer might help make the DT ► PI model clearer. In SMPY's January 1979 search for youths who reason extremely well mathematically, 3,675 boys and girls of upper-three percent math ability, most of them seventh-graders 11 or 12 years old, participated. Nearly 300 of these from a six-state area met the Scholastic Aptitude Test (SAT) score criteria for being invited to be in a fast-paced precalculus class last summer. Of those, 96 accepted the invitation. All but two of these completed the program.

The students came for 5 hours per day, one day per week, for 8 weeks. This was preceded by a day-long standardized testing to help determine initial placement. Thus, about 32 enrolled for Tuesdays, 32 for Wednesdays, and 32 for Thursdays. To work with the 32 on a given day were three instructors and four teaching assistants, all of them graduates of SMPY's earlier math-facilitation efforts. These teachers ranged in age from a 13-year-old Johns Hopkins junior to 20-year-old David Meyer, who had recently completed his B.A. and M.A. degrees in mathematics at Johns Hopkins after having been elected to membership in Phi Beta Kappa as a junior.* All seven were already experienced instructors and or tutors.

The 10-12 students who on the basis of the pretesting already knew the most mathematics were put into the "top" section, and David and the 13-year-old junior worked with them on an individualized basis. The next most knowledgeable group of 11 or 12 students received their individualized instruction from another instructor and his teaching assistant, both of whom were especially skilled in working at this level. The group with the least background, who did not even known Algebra I very well, had its own specially trained instructor and teaching assistant. (The fourth teaching assistant helped where needed). Some shifting among the groups occurred as students forged ahead at considerably different rates. Each student was encouraged to proceed as far as possible along the route from Algebra I through analytic geometry. Five of the 96 went the whole distance, thereby becoming prepared for calculus by the beginning of the eighth grade. In the approximately 35 hours of working time, the typical participant demonstrated mastery of 2 school years of mathematics beyond where he or she had begun.

Results during the fast-paced summer math program of 1978 had been even better, probably mainly because the selection criteria were higher then; only 62 of the 28,000 upper-three-percent youths had qualified. Thirty-three attended, and 12 of them completed all the precalculus subjects well.

While highly successful, SMPY's various procedures occur only because the age-in-grade, Carnegie-unit lockstep of schools, both public and (especially) private, makes such heroic measures essential. If schools were organized differently, SMPY would not have been necessary-nor, indeed, would the present special provisions for most slow learners. In my opinion, age-grading for instruction in academic school subjects has crept insidiously upon us as we have moved from tutorial instruction and the one-room schoolhouse to the current situation. It needs to be reversed. But, of course, that will not be done easily or quickly.

My proposal in the area of mathematics is for a longitudinal teaching team that spans kindergarten through the 12th grade in a school system. Working from a mathematics learning center, the various members of this team would be responsible for meeting all the mathematics needs of all the students in the school system. The buck would stop with them. Every student would be helped to meet clearly stated, rather substantial criteria of mathematical competence. A few students would accomplish these early, perhaps by age 8; a few others would have to work hard until age 18 or so in order to attain the minima. Some students would proceed far beyond the minimum essentials; others would stop with them and devote their efforts thereafter to other subject matter.

Much of the instruction might still be in groups, but not age-graded ones. Attaining levels of achievement instead of A, B, C grades would be stressed. All members of the longitudinal mathematics team would have to be highly competent, but some would specialize in helping slow learners and others in helping fast-moving students.

Obviously, this longitudinal-teaching-teams model could be applied to other subject matter areas such as language arts, social studies, science, and foreign languages. There might also be art, music, drama, physical education, and social and emotional development teams. Attention to individualized differences, both within areas and across areas, would be increased vastly.

I should certainly like to see a sizable public school system pioneer this approach for at least 25 years. Because of problems that one can readily anticipate and many that one cannot, almost certainly this would be extremely difficult. I believe strongly, however, that some such plan is our only hope for the educational future of America's youths. All else will be sorry stop-gaps.

Although increasingly there is much drum beating for the gifted by various associations, including parent groups, a great deal of it seems poorly focused. Avoidance of subject matter by most of them, especially, dooms their efforts to be ineffectual. They place nearly all their gold and energy on the irrelevant-enrichment bandwagon; in my opinion, far too little of it goes into subject matter emphasis and acceleration. This leaves the typical intellectually talented youth unsatisfied because his specific intellectual hungers are not being met. "Let them eat cake" is as poor advice in this matter as it was in the historical context. We should, and certainly can, do far better than that for the intellectually talented. Intervening strongly on their behalf educationally, rather than mainly researching the status quo, is crucial. The National Academy of Education is uniquely able to promote that.

*During the 1979-80 school year, Mr. Meyer studied mathematics and physics at Cambridge University as a Churchill Scholar.

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[1]This paper was presented at the meeting of the National Academy of Education in Boston on October 19, 1979 and reprinted with permission from *Educational Researcher*, Vol. 9, No. 3 (March, 1980), pp. 8-12.

[2]Dr. Julian Stanley is Professor of Psychology and Director of the Study of Mathematically Precocious Youth (SMPY) at the Johns Hopkins University.

TAPS (Tips for Artistically Precocious Students)

Drama

Children interested in developing dramatic skills may want to take advantage of "The Imagination Corporation," Arizona State University's Department of Theatre drama workshops for children. Beginning in early February, these Saturday workshops will be provided for children in grades 1 through 9. Emphasis will be placed on developing creativity, expression and communication skills, and the 7-week series is not geared toward a final performance. Classes for children in grades 1-3 will begin at 9 a.m. and end at 9:50 a.m., classes for 4th through 6th graders will run from 10 a.m. until 10:50 a.m., and classes for 7th through 9th graders will begin at 11 a.m. and finish at noon. For information and registration call Dr. Lin Wright, 965-7662, or the Department of Theatre, 965-5359.

Art

Arizona State University's School of Art will begin its Children's Art Workshops in late January. The workshops, meeting on Saturday mornings on the ASU campus for ten weeks, are offered for children ages five through fourteen from 9 to 10:30 a.m. or from 11 a.m. to 12:30 p.m. Each class introduces the children to a variety of artistic materials as well as to specific periods in art history. The final session is an exhibit of the children's work. For information, contact the Children's Art Workshop, 965-6981, or the Art Department, 965-3468.

Drawing classes are also offered by the Phoenix Art Museum to children in grades one through twelve. These Saturday morning classes will begin on January 14 and run for eight weeks. In addition to its drawing classes, the Phoenix Art Museum offers parent-child workshops for children ages 4 and up. Linda Farnsworth will be conducting a workshop on Expressionism, January 21 from 2 to 4 p.m., and a workshop on Surrealism, January 28 from 2 to 4 p.m. To register for the drawing classes or the parent-child workshops, call Carol Reekes, 257-1880. Younger children might also be interested in the Museum's hands-on exhibit for children entitled "Magnet Madness."

Music

A Sunday concert series will begin January 15 at the Phoenix Art Museum. Most programs will begin at 3 p.m. Of particular interest is a children's program scheduled for January 29th, at which the Encore String Quartet will present an illustrated narrated program about the Great Masters, providing an integration of music and the visual arts.

ANNOUNCING PSAP'S THIRD ANNUAL TRAINING CONFERENCE

The Project for the Study of Academic Precocity (PSAP) will host its Third Annual Training Conference on the campus of Arizona State University February 16-19, 1984. The conference, entitled "Providing Appropriate Educational Services for Intellectually Gifted Students," will attempt to provide teams of administrators or teachers of the gifted with sufficient information about appropriate academic options in subject areas and necessary support services (e.g., counseling and study skills training) for program planning and implementation. It is anticipated that conference participants will be coming from a diversity of circumstances, both geographic and demographic. A variety of educational options will be presented which may be used to draft an implementation plan for participants' home institutions.

Topics to be covered at the conference include identification of children for specific programs, mathematical talent, verbal talent, scope and sequence of curriculum, alternatives for very young children, special strategies for minorities and girls, counseling and support services, administrative structures and accountability and evaluation.

An Advanced Level Conference will also be offered February 14th and 15th in which advanced seminars will address at least the topics of evaluation, study skills, counseling, curriculum, articulation and others according to the specified interests of advanced conferees. For more information write: Third Annual Training Conference, Project for the Study of Academic Precocity (PSAP), Department of Special Education, Arizona State University, Tempe, Arizona 85287, or call (602) 965-4757.

CHRONICLE EDITORSHIP CHANGES HANDS

*by Craig Blurton**

Beginning with this issue of the *Chronicle of Academic and Artistic Precocity* I will no longer serve as editor. That task has fallen on the highly able shoulders of Mrs. Elizabeth Ullman who in the past has served as Associate Editor. This being possibly the last appearance of an article written by me in the *Chronicle*, I thought it appropriate to show my appreciation to several people who have made my work possible. First, of course, I would like to thank Dr. Sanford Cohn for offering me the opportunity to work at the Project for the Study of Academic Precocity (PSAP) in a variety of positions. Although I am not working on a degree in the area of education of the gifted and talented (my specialty is elementary science education), I am intensely interested in the field and have received an invaluable education working at PSAP. Next, I would like to thank two other PSAP employees without whom the *Chronicle* couldn't effectively function, Debbie Lawyer and Bertie Condell. Debbie has helped bring order out of chaos in our subscription and mailing lists and Bertie has typed manuscripts, taken messages, and generally helped with the myriad minutiae such a task invariably occasions. I would also like to express my gratitude to all of those contributors who have either taken time out of their busy schedules to write for us or who have kept us informed of important events in their sphere of interest. And, finally, I would like to thank the children for whom PSAP was founded for the wonderful memories I will take with me of the two PSAP summer residential programs I directed. They were exciting, interesting weeks in which I learned more about the highly able than a hundred courses could have taught.

*Craig Blurton has served the Project in several capacities, as he has noted, over the past two years. We at PSAP are sorry to see him go, but wish him the best of luck both with his dissertation and with his future work in the area of science education. His work as editor of and contributor to the *Chronicle* has been invaluable, and we certainly hope that this is *not* his last *Chronicle* article!

1984 TALENT SEARCH UPDATE

Debbie Lawyer[1]

The Project for the Study of Academic Precocity (PSAP) is currently conducting its fifth annual Talent Search for seventh and eighth graders who are highly able mathematical and verbal reasoners through the use of the Scholastic Aptitude Test (SAT). This year, to date, we have received over 13,000 applications for the 1984 Talent Search from students in Alaska, Arizona, California, Hawaii, Oregon, Washington, and the Canadian provinces of Alberta, British Columbia, Manitoba, Saskatchewan, and Ontario.

Those students who followed the lengthy procedure and registered for the SAT with the Educational Testing Service (ETS) in Princeton, New Jersey, before the December 23, 1983 deadline will take the test on January 28, 1984, at designated test sites throughout the Talent Search region.[2] After PSAP receives 1984 Talent Search participants' SAT scores from ETS, each will receive a counseling packet that will include a Score Interpretation Bulletin to help the students understand what their scores mean and what educational options might be appropriate for them based on those scores. Details of summer programs offered throughout the United States for Talent Search participants at various universities are also included in the counseling packet.

In the late spring, an awards ceremony will be held in each state and province to honor those students who took part in the Talent Search. All Talent Search participants will receive certificates, with high scorers earning special certificates and book awards. Schools with five or more high scorers will also receive certificates and book awards. Top scoring participants will receive single-course scholarships at local colleges and universities. The staff of PSAP wishes all of you who are taking part in the 1984 Talent Search the best of luck!

[1]Debbie Lawyer is Talent Search Administrator for PSAP. For more information about PSAP's annual Talent Search, contact Ms. Lawyer at (602) 965-1460 or write: College of Education, PSAP Talent Search, Arizona State University, Tempe, AZ 85287.

[2]Although the official deadline for application for the SAT is December 23, late registration is possible with a $10 late fee for all forms postmarked before January 4, 1984.

TIPS (Tips for Intellectually Precocious Students)

Science Center to Open

The Phoenix area's first major science museum, the Arizona Museum of Science and Technology (AMSTEC), is scheduled to open in late January at the corner of Adams and 2nd Streets in downtown Phoenix. AMSTEC is a non-profit, participatory science center, and will contain over one hundred hands-on exhibits. These displays will range from an in-depth presentation on energy to life sciences and the body systems to a special area just for youth discovery (including many sensorial exhibits designed for preschoolers and young children). These exhibits and many more are being designed to present science and technology in a way to develop a greater understanding of the world.

The Museum will open with three major sections: Life Sciences, Energy and Youth Discovery. Future sections will include Robotics and Math and Computer Sciences. A nominal fee will be charged for admission. For information, call AMSTEC, 256-9388.

GIFTED CHILDREN

by Frank Laycock[1]

Elizabeth (Jadis) Ullman[2]

Those of us who as parents or educators of gifted children have made a habit of picking up any book with "gifted" in the title often have accumulated a library of such tomes. It eventually seems unlikely to us that we will encounter any introductory text which presents new information or presents old information in a way which will hold our interest for more than a cursory review of its contents. *Gifted Children*, by Frank Laycock, is such a book. Probably the most striking characteristic of the book is the immediate interest it draws from readers who may be said to be well versed in the controversies of gifted education as well as from those who have yet to discover these controversies.

Gifted Children is fascinating to us because it goes beyond a brief introduction to topics in the field. The book becomes more personal through the use of extensive quotes from gifted individuals, psychologists, researchers and biographers. For example, when discussing the typical gifted child, the author quotes John Stuart Mill, who describes his own childhood, rather than giving us a second-hand summary. When Terman's studies are reviewed, Mr. Laycock treats us to Terman's own explanation of his interest in gifted children. Such quotes draw us into the book and give us an "insider's view" of the topics under discussion.

In addition to holding our interest, however, the book presents a systematic, concise and complete introductory review of important issues in the field of gifted education. By beginning with a description of some specific children and expanding to general characteristics of gifted children, Mr. Laycock ensures that while we are aware that some general characteristics do exist we are equally aware that individual differences also exist within the gifted population. In discussing intelligence, specific abilities and creativity, he presents a surprisingly complete history of the development of the construct of intelligence and the controversies and mysteries that still exist in its definition. Mr. Laycock also discusses the more practical considerations of the gifted individual's place in society, appropriate selection of gifted children for special programming (including both a history of past selection processes and a discussion of current trends and developments), the education of these children, and current problems and issues which concern the area of education of the gifted.

Gifted Children is extremely well documented, and may be used as a bibliography for those interested in finding other materials about the topics discussed. While it is written for the intelligent layperson, it also contains more than typically introductory material and presents a concise summary of major developments in the studies of intelligence, measurement, and gifted individuals.

[1]Laycock, F. *Gifted Children*. Glenview, Illinois: Scott, Foresman and Company, 1979.

[2]E. Jadis Ullman is a Masters Degree Candidate at Arizona State University in the area of Education for the Gifted and Editor of the *Chronicle*.

ROBERT HEINLEIN

*by Steve Owen**

In 1939, Robert Heinlein published his first story and within two years he was already being acclaimed by some as the most popular living writer of science fiction. By the mid-1960's, Heinlein had an audience of millions and his works had been translated into 28 languages. All but one of his 35 published books (twenty-six novels and nine collections of short fiction) are presently in paperback print. He is customarily called the Dean of Science Fiction.

Robert Heinlein is the only author who has won the Hugo Award four times. He was the first writer of hardcore science fiction to break into general circulation magazines. He is a leading figure in the development of the modern science fiction movie, television serials, and juvenile novels. Words coined in Heinlein's fiction have become part of our language. Engineers call a certain kind of servo-mechanism a waldo - a term he invented in 1942. Although one of his novels became a bible for some participants in the 60's counterculture, Heinlein is also a respected figure in military circles, chosen to address the United States Naval Academy and to fly in the B-1 bomber.

Heinlein was born on July 7, 1907, to Rex and Bam Heinlein in the small town of Butler, Missouri. Heinlein's parents, childhood sweethearts who graduated together in the Butler High School class of 1896, married in 1899 and lived in the home of the bride's father. Rex Heinlein worked in his Uncle Oscar's general store as a clerk. In 1906, Rex began a series of positions as clerk and cashier with Midland Manufacturing.

Robert's early years were strongly influenced by his Grandfather Lyle who died in 1914. Robert remembers going with Grandfather Lyle, who was a doctor, on his rounds in his horse-drawn buggy. In one of his rare comments about his family background, Heinlein said, "Gramps was a horse-and-buggy doctor who strongly influenced me" (Bester, 1973, p. 44). In his 1973 novel, *Time Enough for Love*, he recalls his childhood in Missouri. "I had forgotten all their faces except Gramp" (Heinlein, 1973, p. 488) and recalls that he "had always been closer to his Grandfather . . . than to his father; not only had his father often been away on business, but also Gramp had been home in the daytime and willing to spend time with him" (Heinlein, 1973, p. 493). In young Robert's eyes, his grandfather seemed to be the body and spirit of the virtues of that time and place: resourceful, shrewd, bold, vigorous, physically and morally tough.

Midland Manufacturing went out of business in 1910. Heinlein's father Rex went to work with his brothers in a newly formed Heinlein Brothers Agricultural Implements Company in Kansas City where he relocated his family. The business lasted only two years, after which Rex went to work as a bookkeeper at the Elite Post Card Company. In 1913, Rex got employment as a bookkeeper for the newly formed International Harvester Company, where he worked as a cashier, bookkeeper, collector, correspondent, and clerk until 1937.

Heinlein's only published comment about his years in Kansas City public schools notes that one of his schoolmates at Greenwood Grammar School was Sally Rand, who was to go on to fame as a fandancer and character in a number of Heinlein's novels such as his 1940 story *Let There Be Light* (Moskiwotz, 1963). Robert graduated from Central High School in 1924 at age 17. His yearbook's list of high-school activities tells us a bit about him: National Honor Society '23, '24; Major R.O.T.C.; President of the Central Officers Club; Captain of the Debate Team; President of the Central Shakespeare Club; Student Council; Kelvin Club; Inter-Society Council; Boys' High School Club; Central Classics Club; Rifle Club. His classmates must have considered him studious as he was voted "Worst Boy Grind." They also demonstrated insight, giving him the yearbook tag line to sum up his character: "He thinks in terms of the fifth dimension, never stopping at the fourth" (Bester, 1973, p. 45). He spent the next year at Kansas City Junior College.

Throughout these school years, Robert was an avid reader of the Frank Reade Jr. and Tom Swift science fiction dime novels. His reading moved on to authors with deep ties to science fiction including Jules Verne, Rudyard Kipling, and Jack London. He became engrossed by the optimistic views of the future projected in Edward Bellamy's *Looking Backward: 200-1887 and Equality*. Heinlein recalls, "Science of all kinds and astronomy in particular were my hobby as a boy and I planned to become an astronomer" (Bester, 1973, p. 44).

In 1925, Heinlein won an appointment to the United States Naval Academy. "I was always honored by Jim Reed (a Boss Pendergast man) because I was the first of his appointees that ever graduated" (Bester, 1973, p. 45). He had a fairly distinguished career at Annapolis, including becoming a champion with the dueling sword. He graduated in 1929 at age 22, twentieth in a class of 243, as an ensign. He served first on destroyers and battleships, then was transferred to the first modern aircraft carrier, the USS Lexington, where he gained the opportunity to fly. In 1934 his naval career ended abruptly. He contracted tuberculosis, and retired at age 27, a lieutenant, with a lifetime medical disability.

Having married just after his graduation from Annapolis, he was now in the middle of the Depression with a wife but no career. He began doing graduate work in physics and mathematics at the University of California at Los Angeles, but once again his health failed, forcing him to go to Colorado to recuperate. During these years he tried many endeavors, including architecture, selling real estate, buying interest in a silver mine, and even running in the Democratic primary to unseat the state representative Charlie Lion. Heinlein came in second.

In 1939, Heinlein saw an ad in *Thrilling Wonder Stories* offering a price of fifty dollars for the best amateur short story. After writing his first science fiction tale, he found out that *Astounding Science Fiction* was paying a penny a word. Since his story ran to 7,000 words he sent it to *Astounding Science Fiction*. They bought it for twenty dollars more than he would have won in the contest, and Robert Heinlein began his lifetime career at age 32.

Astounding Science Fiction regularly conducted polls of its readers to determine which stories they liked best. Soon the most popular writer was Robert A. Heinlein, often rivaled by "Anson Macdonald," a pen name often used by Heinlein.

Heinlein's new career halted temporarily after the United States entered World War II in 1941. He returned to the employment of the Navy, now as a civilian engineer in the Naval Air Material Center in Philadelphia, where he worked in the designing and testing of materials associated with naval aviation, including plastics and high-pressure suits. His only publications during this time were technical monographs. One of his co-workers was Navy Lieutenant Virginia Gerstenfeld, a test engineer and chemist, whom he was to marry in 1948 after a postwar divorce from his first wife. Virginia became an important influence on his later works, sometimes as virtually a full collaborator.

After World War II, Heinlein experimented with several kinds of writing (detective stories, girl's stories and articles warning about nuclear threats) before settling down to science fiction. By 1947, the second wave of his science fiction career began. He began publishing two series of stories, both glorifying space travel. One was published in the Saturday Evening Post, the first science fiction magazine story. The other, beginning with *Rocket Ship Galileo*, was a series of juvenile space novels. In 1950, he helped turn *Rocket Ship Galileo* into what is often called the first modern science fiction movie, *Destination Moon*. His second juvenile novel, *Space Cadet* (1948), became the basis for the first modern science fiction television serial, *Tom Corbett: Space Cadet*. His tremendous productive burst, begun in 1947 at age 40, ended in 1959. During this period he had published 26 stories, 16 novels, 3 extensively revised novels, 2 screenplays, dozens of articles and radio and television scripts.

A third period of Heinlein's writing career began in 1961 when he was 54, with a novel that has sold over two million copies, has made him one of the more controversial writers of our time, and has established him as a central figure in modern American culture: *Stranger in a Strange Land*. Abandoning the short story that led his career, he quickly wrote four controversial novels. This burst of writing ended in 1966 and was not to surface again until 1970, when the first of two massive novels emerged. These two novels both generated a fresh storm of enthusiasm and outrage. In 1980, at age 73, Heinlein published his book *The Number of the Beast*, a whimsical apocolypse.

Although Heinlein began his career as a writer relatively late in life, his work has been overpowering not only in quantity but in its creativity and insight. His writing career has been punctuated by four distinct periods of productivity at ages 40, 54, 63, and perhaps most recently at age 73. In each of these periods he has lived out the prediction of his high-school classmates, seeming always to think in a dimension and a time more complex than our own and managing, somehow, to transport us there.

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